THE CHARACTERS OF THE CLASSES, ORDERS, GENERA, AND SPECIES; OR, THE CHARACTERISTIC OF THE NATURAL HISTORY SYSTEM OF *MINERALOGY*.

INTENDED TO ENABLE STUDENTS TO DISCRIMINATE MINERALS ON PRINCIPLES SIMILAR TO THOSE OF BOTANY AND ZOOLOGY.

BY

FREDERICK MOHS,

PROFESSOR OF MINERALOGY, FREIBERG.

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INTRODUCTION.

Ever since I began in the year 1812 to teach Mineralogy, according to the principles of Zoology and Botany, or of Natural History in general, it has been my wish to put into the hands of my students a text book, which might serve them as a guide, not only during their attendance upon my lectures, but also in the further prosecution of their studies.

To obtain this last and important object, it is necessary that such a work, besides the principles of classification and of nomenclature, should contain the Characters of the Classes, Orders, Genera, and Species of the Natural History System of Mineralogy; in a word, the Characteristic; and this work would at the same time, have been the best means of preserving these objects in their purity.

It is obvious, that the investigation and application of the Characteristic, besides the principles above alluded to, presuppose in particular, a knowledge of the characters on which it is founded. The science of Characters comprehends, as its most essential part, Crystallography; but a system of Crystallography properly prepared for the purposes of Natural History, is an object which has not yet been accomplished, and for which even the valuable labours of the celebrated Abbe Haüy, have not appeared to me to be sufficient.

To Scientific Mineralogy, a knowledge of Crystallography is absolutely indispensable, in order that we may obtain general and distinct notions of the Natural History species, without which there can be no Natural History. I have always regarded it as improper to lay any thing before the public, the principles of which have not been previously explained, or explained at the time of publication. With respect to the Characteristic, I could not have avoided committing this impropriety, so long as my Crystallography remained uncompleted, or at least was not prepared for publication; and this has been the reason why I have hitherto not yielded to my wishes, although the necessity for doing so became every day more urgent.

In the spring of 1818, I had the pleasure of seeing my much respected friend, the celebrated Professor Jameson, at Edinburgh, to whom Mineralogy has been so much indebted, both by his extending the knowledge of it in Great Britain, and by his exciting a general interest for it, in that country where so much has already been done, and where it may be expected that in a short time so much more will be accomplished. I found him occupied with ideas respecting the Natural History of the mineral kingdom, which were similar to my own; and we soon came to agree with one another, with regard to its most important points, because in fact our opinions had in a great measure coincided, before being mutually communicated.

Professor Jameson at that time was about to publish the third edition of his excellent system of Mineralogy, a work which appeared at the commencement of the present year, and of which, through his kindness, I received a copy a few days ago. He was desirous to introduce into this edition, some things which I had investigated more fully than he had done; and I could not have any objection to a procedure so open. Professor Jameson, as appears by his work, has carried this into effect, in the manner which he must have considered to be best adapted to the circumstances in which he was placed; and he seems to have been actuated with an intention to adopt by degrees the pure Natural History method; and to avoid the appearance of producing a work entirely new, he considered it as necessary to retain as much as possible, the form of the earlier editions: under other circumstances, he would probably have proceeded in a different manner. By this, however, the connection of the different parts of the Natural History System of Mineralogy must be somewhat disturbed, the Characteristic must lose a portion of its usefulness, and the Systematic Nomenclature must undergo considerable changes.

In order to give a general view of the whole, which my respected friend acknowledges to be necessary as an introduction, that which his valuable work contains, may be sufficient to intelligent readers, who know how to unite the parts which are separated, to restore their connection, and to distinguish the essential from the unimportant. But this is not sufficient to supply the immediate necessities of the beginner, which is the object of every system, and the merit for which the Natural History method may be peculiarly recommended, and which will be rendered more obvious when fairly introduced into practice.

For these reasons, and as my views are already partly before the public, I feel myself called upon to lay aside my scruples, and have resolved to publish the NATURAL HISTORY CHARACTERISTIC in its original form, accompanied only with a short explanation of the expressions and signs employed in the system. I publish it in English, as well as in German, because I have been convinced, by the perusal of my friend's work, that it must be difficult for any one who is not very conversant with the use of the Characteristic, or indeed, I might almost say, who had not invented it himself, to give an accurate account of it. This small work is designed partly also for the use of my pupils, who, being acquainted not only with the principles upon which the Characteristic is founded, but also with its use, understand it perfectly, and know how to apply it properly. In order, however, that the Mineralogical public may be enabled to form a just estimate of the Characteristic, and of points immediately connected with it, and that I myself might have an opportunity to correct, improve, and bring these to perfection, I have also resolved to publish, both in German and English, as speedily as circumstances will permit, the ELEMENTS OF CRYSTALLOGRAPHY, and a TREATISE ON MINERALOGY; in the preparation of which I have for many years been occupied.

In this manner, I hope to have sufficiently accounted for the step I have unwillingly taken with regard to the present work; and it only remains for me to beg the candid reader to suspend his censure, should parts appear to him, not to give that satisfaction, which I trust they would have done, had circumstances permitted me to follow the order of publication, which I had contemplated.

The explanations referred to above are the following:

The Specific Character consists particularly of three *Characters*, which, if the properties of the species would allow it, are given in all instances. These are the Crystalline forms (including cleavage), the degrees of hardness, and the Specific Gravity. The Crystalline forms may be reduced in all cases to one of four Systems of Crystallisation*, the Rhombohedral, or that which is derived from a rhombohedron; the Pyramidal, or that which is derived from an isosceles four sided pyramid; the Prismatic, or that which is derived from a scalene four sided pyramid; and lastly, the Tessular, or that which is derived from the hexahedron.

The forms of the three first are indicated in the Characteristic by initial letters, with or without numbers or signs; those of the tessular are expressed at large.

The letter R refers always to the Rhombohedral System, and means, without any exception, a rhombohedron. The letter P may refer to either of the three first systems; and though it always means a pyramid, it has different significations. The specific character indicates to which system it refers, and determines its signification. If this system be

* The Systems of Crystallisation are founded upon, and express the assemblage of those relations which exist between certain forms; and the developement of these, constitutes the peculiarity of the Crystallography, adapted to the Natural History of the mineral kingdom. They are not, therefore, that mere collection of forms for which they are generally taken.

the rhombohedral, P will be an isosceles six sided pyramid; if it be the pyramidal, P will be an isosceles; and if it be the prismatic, P will be a scalene four sided pyramid.

All compositions of these letters with numbers or signs, refer to the same system to which the simple letters refer. Thus R+1, or more generally R+n, design also rhombohedrons, which bear to R (the angles of which, if known, are given in the specific character) a certain relation, of which the explanation must be deferred until the publication of my Elements of Crystallography. R—∞ denotes a plane perpendicular to the axis of a rhombohedron, or of any form belonging to the rhombohedral system, and is considered as a rhombohedron of an infinitely short axis, the side of its horizontal projection remaining a finite line. R+∞ is a regular six sided prism, in such a position that it cuts the faces of the rhombohedron in horizontal lines or edges, or, which is the same, in edges parallel to the horizontal diagonals of this form; and is considered as a rhombohedron of an infinite axis. Those two forms (R—∞ and R+∞), represent the limits of the series of rhombohedrons of which nature (for instance in *rhombohedral Calc-Haloïde)* presents many members.* 2R denotes a combination of two rhombohedrons equal and similar to each other, in such a position, that they assume the appearance of an isosceles six sided pyramid; and it is called a DIRHOMBOHEDRON.

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* Similar series are found in the other systems. They are the most remarkable appearances in the inorganic nature, and the basis of the Crystallography, adapted to the Natural History of the mineral kingdom.

In the Rhombohedral System $P \pm 1$ or $P \pm n$ are isosceles six sided pyramids, whose difference from the dirhombohedron will be explained in Crystallography. $P - \infty$ is a plane perpendicular to the axis of a rhombohedral form, which, since it cannot be distinguished from $R - \infty$, is not noticed in the Characteristic. $P + \infty$ is a regular six sided prism, distinguished from $R + \infty$ by its position, and is therefore not to be confounded with it. The faces of $P + \infty$ do not cut the faces of the rhombohedrons in horizontal lines or edges, or, which is the same, in such as are parallel to the horizontal diagonals; but in such a manner, that their faces remain rhombs; or in other words, the section is parallel to their edges. The same applies to the dirhombohedrons, when they are resolved into simple forms. $P - \infty$ and $P + \infty$, are the limits of the series of isosceles six sided pyramids.

In the Pyramidal System, $P \pm 1$, or in general $P \pm n$, are isosceles four sided pyramids, deduced from P. $P - \infty$ means, in like manner, a plane perpendicular to the axis of an isosceles four sided pyramid, or of some other form connected with it, and is looked upon as an isosceles four sided pyramid of an infinitely short axis; whereas $P + \infty$, a rectangular prism, is considered as an isosceles four sided pyramid, of an infinite axis. These two forms are also the limits of the series of isosceles four sided pyramids. But there is, in respect to the prisms, a distinction to be made. If the faces of the rectangular prism cut the faces of the pyramid P in such a manner as to produce edges parallel to the edges at the base of this pyramid, the prism is called the PARALLEL PRISM, and keeps the sign given above. But if the faces of the prism intersect the faces of P, so that the lines or edges of intersection are parallel to those edges of the pyramid which end in the apex of its axis, the prism is called the DIAGONAL PRISM (the intersections being in this case parallel to the diagonals of the base of P), and it has [$P+\infty$] for its sign.

In the Prismatic System, P has different significations, which are determined by numbers and other signs. The single P is a scalene four sided pyramid, and represents the fundamental form of a species. $P\pm1$, or $P\pm n$, are also scalene four sided pyramids, of the same base with P, and only distinguished from it by the proportions or lengths of their axes. $P-\infty$ is again a plane perpendicular to the axis of a prismatic form; and $P+\infty$, an oblique angular prism, of similar base with P: these two last are the limits of that series which is formed by substituting for n in the expression $P\pm n$, whole numbers, in their natural order. But, moreover, there exists still two kinds of scalene four sided pyramids, also connected with P, but having bases which are not similar to the base of P. The first kind contains those, in the bases of which, one diagonal of P; the other those, in the bases of which, neither of the diagonals of P remains unaltered. Still, however, the diagonals, consequently the angles of the base, depend on those of P. The first are denoted by the general expression $(P\pm n)^m$; the second by $(Pr\pm n)^m$.

This designation, however, is not yet sufficient. It is necessary to express also the relation between these two kinds of forms and P, so that by the sign it may be seen which of the diagonals of the base of P remains in the first kind unchanged; and in the second, is to be changed, according to a certain determined proportion. This is done in the following manner.

In the first kind $(\breve{P}+n)^m$ signifies, that in the base of this scalene four sided pyramid, the longer diagonal remains unchanged, whilst $(\bar{P}+n)^m$, signifies that in the base of this scalene four sided pyramid (different from the former), the shorter diagonal of P remains unchanged. In the second kind $(\breve{Pr}+n)^m$, likewise denotes that the longer diagonal of P must be altered in a determined proportion. On the other hand $(\bar{Pr}+n)^m$ signifies that the shorter diagonal of P must be altered in the same determined proportion which is found from the value of *m*; but still so, that neither in the first case the shorter, nor in the second the longer diagonal, remain unchanged. The forms of these two kinds are said to belong to that diagonal of P, which in the first remains unchanged, and in the second is changed in that determined proportion to which the sign refers. The letter *m* is a number determined by experience, and has an influence in the dimensions or angles of these pyramids.

The Characteristic contains no example of the forms just now described, but of those oblique angular four sided prisms which limit the series of the pyramids with which the prisms have consequently the same bases. Thus $(\breve{P}+\infty)^m$, $(\bar{P}+\infty)^m$, $\breve{Pr}+\infty)^m$, $(\bar{Pr}+\infty)^m$, substituting for *m* the numbers determined by experience, as the examples in the Characteristic shew, represent oblique angular four sided prisms, which differ from each other, and from $P+\infty$, by the dimensions or angles of their bases. If in a species, the dimensions or angles of P are known, those of the oblique angular four sided prisms, occurring in that species, are also given.

All the prisms hitherto mentioned, are VERTICAL ones, or in other terms, such, that their axes are vertical, if those forms, in the combination of which they appear, are in an upright position. In the prismatic system, there occur, however, prisms, whose axes have a horizontal direction. When the combinations in which these prisms enter are in an upright position, these are named HORIZONTAL prisms. The general expression for a horizontal prism, is $\mathrm{Pr}\underline{+n}$; where n, as in all former general expressions, may be any whole number, even $=0$, or $=\infty$. $\mathrm{Pr}\underline{+1}$ are therefore also such horizontal prisms, and $\mathrm{Pr}-\infty$, $\mathrm{Pr}+\infty$, the limits of the series, obtained by substituting for n, whole numbers in their natural order.

If $\mathrm{P}+\infty$ be a vertical prism, the faces of $\mathrm{Pr}\underline{+n}$, n being a finite number, will appear as bevelments on its extremities, and the planes of these bevelments will be set upon the edges of $\mathrm{P}+\infty$. But, as these edges may be the acute, as well as the obtuse ones, or what comes to the same, as between them the longer, as well as the shorter diagonal, may be contained, this must be shewn by the signs. In the first case, the sign will be $\mathrm{P}\breve{\mathrm{r}}\underline{+n}$, whereas in the second, $\mathrm{P}\bar{\mathrm{r}}\underline{+n}$. If $n=-\infty$, the faces of the bevelment fall into one plane, perpendicular to the axis of $\mathrm{P}+\infty$, and as this plane is the same with $\mathrm{P}-\infty$, no notice is taken of it in the Characteristic. If $n=+\infty$, the faces of the bevelment become parallel to the axis of $\mathrm{P}+\infty$; or they appear as truncations on the respective edges of this oblique angular four sided prism. $\breve{P}r+\infty$ and $\bar{P}r+\infty$ combined together, produce evidently a rectangular prism, the termination of which, in the direction of its axis, depends upon other forms, which may be contained in the combination.

A full explanation of this matter being intimately connected with the theory of the scalene four sided pyramid, would require more room than can be here spared. But for the application of the Characteristic, what has been said will be found sufficient, and no doubts will remain, if the reader will merely recollect, that in the prismatic system, P, the fundamental form of a species, and also $P\pm n$, the derivations from P, are scalene four sided pyramids, and $P+\infty$, a vertical oblique-angular four sided prism, all having the same base; whereas $(\breve{P}+\infty)^m$, $(\bar{P}+\infty)^m$, $(\breve{P}r+\infty)^m$, and $(\bar{P}r+\infty)^m$ are also vertical oblique-angular four sided prisms, distinguished from each other and from $P+\infty$, by their bases; and at the same time, that $\breve{P}r\pm n$, $\bar{P}r\pm n$, signify horizontal prisms, or bevelments on the ends at $P+\infty$, the faces of the first set on the acute, the faces of the latter on the obtuse edges of $P+\infty$; and lastly, that $\breve{P}r+\infty$ and $\bar{P}r+\infty$ effect truncations, the first of the acute, the second of the obtuse edges of $P+\infty$, or that they are in general faces which pass through the axis and the diagonals of the basis of P.

By means of these signs, not only the crystalline forms, but also the cleavage, have been expressed; and there remains only to point out the manner in which this has been done.

In the specific character, the first character given is the system of crystallisation; to this, form and cleavage of the species belong. Then follows, together with its dimensions (if known), the fundamental form, from which all other simple and compound forms are derived. In rhombohedrons, that edge which ends in the apex of the axis is given; for instance, in *rhombohedral Calc-Haloïde*, $R = 105° 5'$; in isosceles four sided pyramids, both edges, first that which passes through the apex of the axis, and then that on the base, are mentioned; for instance in *pyramidal Zircon*, $P = 123° 19'$; $84° 20'$; and in scalene four sided pyramids, first, both of those edges which cut the axis, then that at the basis, are given: thus in *prismatic Topaz* $P = 141° 7'$; $101° 52'$; $90° 55'$. In this system, besides the dimensions of the finite forms, those of the infinite ones, or of the limits, are mentioned, as in the last example $P+\infty = 124° 19'$, and so on; which is very convenient, as the cases in which these can be examined, occur more frequently than those in which the edges of pyramids can be measured.

With respect to CLEAVAGE, the expression "Cleavage, R," for instance, in *rhombohedral Calc-Holoïde*, means, that this mineral has its cleavage parallel to the faces of a rhombohedron, similar to the fundamental form of this species; "Cleavage, $P - \infty$, $P + \infty$, $[P+\infty]$" in *pyramidal Garnet*, means, that this mineral has its cleavage parallel to the faces of two rectangular prisms, and at the same time perpendicular to their axis; "Cleavage, $P\breve{r}+\infty$" in *prismatic Chrysolite*, indicates, that the cleavage of this mineral passes at the same time through the axis and the short diagonal of the prism $P+\infty$; and "Cleavage, $(Pr+\infty)^3 = 87° 42'$, $P\breve{r}+\infty$. $P\bar{r}+\infty$," expresses, for instance, in *pyramido-prismatic Augite-Spar*, that the individuals of this species can be cleaved, first, parallel to the faces of an oblique angular four sided prism, of the given dimensions; and secondly, parallel to planes which pass through the axis and both diagonals of the prism $P + \infty$; or, what comes to the same, parallel to the faces of a rectangular prism.

There occurs in the prismatic system, without, however, being peculiar to it, a very remarkable appearance, relating to form and cleavage. It very often happens, that of the faces of one or more forms, contained in a combination, not the whole number, but only half of them, are to be found; for instance, instead of eight faces of a scalene four sided pyramid, only four; or instead of four faces of an oblique-angular four sided prism, only two; and that, if such a form be the form of CLEAVAGE, the same takes place. *Pyramido-prismatic Augite-Spar* shews an example of it, where the two faces of the pyramid P, which meet under an angle of 120°, appear often as faces of crystallisation, and sometimes as faces of cleavage, while the others are wanting. Combinations or cleavages of this kind, are called HEMIPRISMATIC, and their sign is in the above mentioned instance, $\frac{P}{2}$. From this explanation it is easy to understand what is meant in *prismatoidal Gypsum Haloïde*, by the sign $\frac{\bar{Pr}}{2}$. In like manner the expression TETARTO PRISMATIC is applied, in the prismatic system, to combinations, in which, instead of the eight faces of a scalene four sided pyramid, only two of them appear.

Cleavage is termed PRISMATOIDAL, if its planes pass through the axis of a vertical four sided prism, and are at the same time parallel, either to one of its faces, or to one of its diagonals. This expression is used in cases where a more accurate determination has been impossible. Cleavage is said to be DIPRISMATIC, if its planes have the direction of the faces of a vertical, and at the same time of a horizontal prism; and it is termed AXOTOMOUS, if it appears in a single plane, perpendicular to the axis of any form which does not belong to the tessular system.

The degrees of HARDNESS, or (if not constant) their limits, are expressed by numbers; and the letter H. designs hardness in general (as Sp. Gr. does specific gravity). Thus in *rhombohedral Calc-Holoïde* "H. = 3·0;" in *rhombohedral Tourmaline* "H. = 7·0...7·5." These numbers refer to the following scale:

The number

1. denotes the degree of hardness of a variety of PRISMATIC TALC-MICA, known by the name of common talc.
2. of a variety of PRISMATOIDAL GYPSUM-HALOÏDE, of imperfect cleavage, and not perfectly transparent. Varieties perfectly transparent and crystallised, are commonly too soft.
3. of a cleavable variety of RHOMBOHEDRAL CALC-HALOÏDE;
4. of OCTAHEDRAL FLUOR-HALOÏDE;
5. of RHOMBOHEDRAL FLUOR-HALOÏDE;
6. of PRISMATIC FELD-SPAR;
7. of RHOMBOHEDRAL QUARZ;
8. of PRISMATIC TOPAZ;
9. of RHOMBOHEDRAL CORUNDUM;
10. of OCTAHEDRAL DIAMOND.

The degrees of hardness of a mineral, which is to be determined, must be compared with the hardness of the different members of this scale, by a fine and very hard file. In regard to the angles and edges of the mineral which touch the file, there are some precautions to be taken, which may be easier determined after a few trials, than by a description, which at present would lead us too far.

Specific gravity has been determined with great care, and other authorities have only been referred to, when there was no opportunity to make observations of my own.

Of colour and lustre very little use has been made. Still, they are sometimes applied in the characters of the species, genera, and orders; and they require therefore some explanations. It is, however, to be expected, that Natural History in future times shall not need such nice distinctions, which have only been resorted to for want of better.

Metallic colours are applied as it has hitherto been usual. Metallic lustre is divided into perfect and imperfect metallic lustre. The first may be seen in *hexahedral Lead-Glance*, in *pyramidal Copper-Pyrites;* the second in *prismatic Tantalum-Ore*, in *uncleavable Uranium-Ore*, and others. Adamantine-lustre has also been divided into metallic-adamantine and common-adamantine-lustre. The first is to be found in dark coloured varieties of *rhombohedral* and *prismato-rhombohedral Ruby-Blende*, in several varieties of *diprismatic Lead-Baryte*, the other in *octahedral Diamond*, in light coloured varieties of *rhombohedral* and *prismato-rhombohedral Ruby-Blende*, in *pyramidal Tin-Ore*, &c. Resinous lustre, as in *dodecahedral* and *pyramidal Garnet*, VITREOUS LUSTRE in *prismatic Topaz*, and in *rhombohedral Quarz*—are left as they have formerly been employed. Whereas PEARLY LUSTRE admits again of a division into COMMON and METALLIC-PEARLY-LUSTRE; the first may be observed in the varieties of *hemi-prismatic Kouphone Spar*, or in *prismatic Disthene Spar*—the other in different varieties of *prismatic* and of *hemiprismatic Schiller-Spar*, and of *prismatoidal Sulphur*.

In simple minerals, pearly lustre occurs only on the faces of crystals, or on the planes of cleavage. When, therefore, in the Characteristic, this kind of lustre has been mentioned, it implies the existence of such faces; and where a plane of cleavage has been termed EMINENT, pearly lustre is to be understood.

The colour of the powder of a mineral, or what is commonly called the STREAK, sometimes affords good characters. There is in this case no other explanation wanting, but that "UNCOLOURED" means a streak of white or grey colour.

The expression "METALLIC" refers to a perfect metallic appearance, and includes PERFECT METALLIC LUSTRE. "NOT METALLIC" means every appearance, except the perfect metallic, and includes therefore also the imperfect metallic lustre.

A naturalist who has employed himself in composing a characteristic for the use of a system, the basis of which is the similarity exhibited by the productions of nature, will be aware of the difficulties inseparable from such an undertaking. One of these difficulties is, that the properties of the objects of the classification can sometimes only be applied as characters under certain conditions. A system of this kind is not a simple division, in which the principles of the distribution afford the characters, and in which these characters, already fixed, determine the notions of the orders, genera, and species; but it is a composition of notions, founded on the similarity which prevails among the objects, and in which the orders, genera, and species already fixed, determine the characters. One and the same character may, therefore, appear in very different orders and genera, but under such circumstances, that it cannot be left out, though it be common to them. In such cases, the condition under which it takes place, or under which it has been used as a character in the present Characteristic, is joined to it, and the conditioning and the conditioned characters are separated by this sign (:).

If, for instance, a solid mineral shall belong to the first class, it *must* be sapid; and the character of this class is therefore, "If solid: sapid;" where solidity is the condition under which the property of sapidity *must* take place. By means of those conditional characters, that distracting crowd of words which is nowhere more insupportable than in Natural History, has been avoided. The characters must be literally taken, and admit of no explanation or other sense, but what the words express. In the instance just mentioned, it would be wrong to conclude, that if a mineral which shall belong to the first class is not solid, it must be insipid. The character does not express this, and it is therefore quite indifferent whether, if not solid, the mineral has any taste or not. Sometimes the conditioning, sometimes the conditioned character, at other times both, are compound, or consist of more than one character. The general form of the expression, in such a case, will be A+B : C+D.

If two or more characters, the one of which excludes the other, be put together, in the character of an order or a genus, as in the genus Corundum "*tessular, rhombohedral, prismatic,*" the meaning is, that an individual, belonging to this genus, must be either tessular, or rhombohedral or prismatic; because only one of these three can take place at the same time. In the specific character this never happens, because all its forms must belong to one system.

It would be superfluous to shew the application of the Characteristic in general, since it is exactly the same as in Zoology and Botany.

If a mineral is to be determined, first its FORM must be made out, at least so far as to know the system to which it belongs; then HARDNESS and SPECIFIC GRAVITY must be tried with proper accuracy, and expressed in numbers. It is sufficient, however, to know the latter to one or two decimals. The specific character *requires* these data; and they are also of use in the characters of the genera, orders, and classes. This being done, the Characteristic may be applied, and it will at the same time point out what other characters are wanting; so that a mere inspection of the mineral, or a very easy experiment, for instance, to try the streak upon a file, or still better, upon a plate of porcelain biscuit, will be sufficient. Having advanced in this manner to the character of the species, it will in some instances be necessary, and in all cases advisable, for the sake of certainty, to have recourse to the dimensions of the forms.

This is particularly necessary, if the genus to which the mineral belongs contains several species, having forms of the same system, as is the case in the genus *Augite-Spar*. This determination of the dimensions of the forms may be effected by the common gonyometer, the differences in the angles being in general so great, that they cannot easily be missed, even by the application of this instrument.

It will seldom be necessary to read over the whole of any character of a class, order, genus, or species, excepting those which comprise the individual; one part that does not agree, sufficing for its exclusion. Thus even the characters of the orders, though the longest, will not be found troublesome.

The application of the Characteristic will become very easy and expeditious, by taking particular notice of some characters, which may be termed PROMINENT. Such are a metallic appearance; a high degree of specific gravity, particularly if the appearance is not metallic; and a high degree of hardness. The observation of these will immediately decide whether an individual can belong to any particular class, order, genus, or species. It is understood, that if it be not thereby excluded, the other characters must next be examined, till either an excluding one be found, or if not, the individual may be considered as belonging to that class, order, &c. with which it has been compared, and found to agree.

In illustration of this, let us take the following example: Let the form of an unknown mineral be a combination of a scalene eight sided pyramid, of an isosceles four sided pyramid, and of a rectangular four sided prism; the cleavage parallel to the faces of two rectangular four sided prisms, in diagonal position to each other; form and cleavage therefore PYRAMIDAL, or belonging to the pyramidal system. Let HARDNESS be = 6·5; SPECIFIC GRAVITY = 6·9.

In this case, both hardness and specific gravity are prominent characters, and exclude the individual at once from the first and third, but not from the second class; with the character of which, its other properties also perfectly agree. Hence the individual belongs to the second class.

Comparing the properties of the individual with the characters of the orders in the second class; hardness and specific gravity will be found too great for the orders Haloïde; hardness too great for the orders Baryte and Kerate; both of them too great for the orders Malachite and Mica; and specific gravity too great for the orders Spar and Gem. But in the character of the order Ore, both hardness and specific gravity fall between the fixed limits, and cannot exclude the individual from this order. The other parts of this character are now to be taken in consideration. If the appearance of the individual be metallic, its colour must be black, otherwise it cannot belong to the order Ore. But the appearance is not metallic; therefore the colour of the individual is quite indifferent; that is, this conditional part of the character does not affect the individual, and consequently cannot decide. Since the appearance is not metallic, the individual must exhibit adamantine or imperfect metallic lustre. The first will be found, particularly in the fracture. The next part of the character refers to minerals of a red, yellow, brown, or black streak; and as the individual gives neither of these, its streak being uncoloured, this part of the character does not come into consideration. Hardness keeps between the limits. Should it be = 4·5 and less, the streak must be yellow, red, or black; but hardness is = 6·5, therefore the colour of the streak is indifferent. If hardness be = 6·5 and more, and streak uncoloured, then specific gravity must be = 6·5 and more. Now this condition takes place; hardness is = 6·5; streak is uncoloured. But also the conditioned character takes place, specific gravity being = 6·9, which is greater than 6·5. Lastly, specific gravity keeps within the limits.

As respects the individual which is to be determined, all the characters in the Character of the order Ore, may be divided into two parts. The first part contains those which refer to the individual; the second those which do not; the last are not decisive. But with the first all the properties of the individual concur. These properties agree consequently with the whole character of the order, as far as it is applicable to the individual, and determine it to belong to the order Ore; or, in shorter terms, to be an Ore.

Beginners may also compare the characters of the remaining orders. Sometimes they find, as I have occasionally observed, one individual belonging to two orders, in which case there must evidently be a mistake in the comparison, which would perhaps not have been discovered had they stopt at the first not excluding order. In the present case, the not metallic appearance excludes the individual from the orders Metal, Pyrites, and Glance; hardness from the order Blende; and hardness and specific gravity from the order Sulphur. The individual can therefore be nothing else than an Ore; and the characters of the genera of the order Ore may now be examined.

Considering again hardness and specific gravity as prominent, the individual will be immediately excluded from the genera Titanium-Ore, Zinc-Ore, and Copper-Ore, but not from the genus Tin-Ore; and the form being pyramidal, and the streak uncoloured, also agree with this genus. From the genus Schelium-Ore, it is excluded by its too great hardness, and too little specific gravity; from the genera Tantalum, Uranium, Cerium, Chrome, Iron, and Manganese-Ore, by hardness and specific gravity, both of them being too great; as also by its uncoloured streak, which only agrees with that genus from which the individual differs most, by its hardness and specific gravity. The form also does not agree with any in these genera; consequently the individual can belong to no other than to the genus Tin-Ore.

This genus contains but one species. The conclusion that the individual must belong to this species, might, nevertheless, be erroneous. There could exist a second species of this genus. The dimensions of the form must now be accurately considered. If these coincide with the angles given in the character, the highest degree of certainty that the individual belongs to, or is *pyramidal Tin-Ore*, will be obtained.

The perfect determination of an individual depends, as the above example has shewn, upon the possibility of making out correctly those three properties, viz. form, including cleavage; hardness, and specific gravity. In Botany it is the same. The characters must be observable, otherwise the determination will be impossible. In Mineralogy, the Characteristic affords sometimes more: it leads to a correct determination, even if the knowledge of the form remains imperfect. But such a determination wants evidence; and for this reason it will be an useful rule for beginners to occupy themselves at first with the determination of such individuals as present properties which can be easily and fully investigated. The rest will come of itself, when their knowledge of the mineral kingdom, and particularly of the properties of minerals, increases, and when they have, by experience, acquired the skill to judge properly of form and cleavage, at least so far as is necessary for the determination of the system of crystallisation, even in those cases where form and cleavage are somewhat difficult to be observed. This exercise I must recommend to every naturalist who intends to acquire a satisfactory knowledge of minerals, with the help of the Characteristic. I shall, in my "Treatise on Mineralogy," find an opportunity to add some further remarks upon this subject, and to explain what is called the MEDIATE DETERMINATION, which must be resorted to in cases where one or more of the principal characters are wanting.

The perfection of the Characteristic, and consequently the security in its application, depend entirely upon the accuracy of our knowledge of the Natural History properties of minerals. In my first essays to compose the Characteristic, I met with very great difficulties. I was obliged to make use of many data upon the authorities of others, which occasioned much loss of time. When by degrees those data became more correct, and I found myself assisted by a crystallography treated in a manner adapted to the purposes of Natural History, the difficulties diminished, and I became fully convinced that they will entirely disappear, when, in future, our knowledge of the properties of minerals shall have advanced nearer perfection. This applies particularly to the first class, which is at present so imperfectly known, that it has been introduced, and the systematical nomenclature applied to it, only to exhibit the whole. The intelligent reader will observe, that although much has already been done, much still remains. It is on this account the Characteristic, even in the other classes, will in some respects, be found defective. Of this I am well aware, but it could not be avoided with the means at present in our possession. It is evident, that to remove these difficulties, no foreign assistance can be resorted to without sacrificing the principles adopted, and ruining the science itself.

Although obliged to refer much, in respect to the several subjects mentioned in this introduction, to those more extensive works which I propose publishing shortly, yet I cannot forbear noticing, that if a beginner has an opportunity to observe in nature the orders of the Natural History system, and to impress upon his mind an idea of them, he will be greatly assisted in the application of the Characteristic. This is evident from the nature of the subject, and requires no other proof. I have, however, been convinced of it, by the experience of many years. The excellent collection of minerals, presented by His Imperial Highness the Archduke John of Austria, to the institution which bears the name of this illustrious prince, is so arranged, as to shew the orders of the Natural History system. The effect of this arrangement made a strong impression on the minds of my Austrian pupils; and the rapid progress, with which they acquired a knowledge of mineralogy, was highly gratifying to me. Nor can I omit this opportunity of mentioning with pleasure, that some of them, distinguished by eminent talents and indefatigable application, and supported by an extensive knowledge in mathematics, are already deeply skilled in the science, and promise to do much for its advancement. I therefore point out, for the attention of those whose province it is, to communicate to others, the knowledge of the products of the mineral kingdom, the great utility of such an arrangement of minerals, that they may avail themselves of a means, the advantage of which experience has already confirmed.

CHARACTERS

OF THE

CLASSES.

CLASS I.

If solid: sapid. No bituminous odour. Sp. Gr. under 3·8.

CLASS II.

Insipid. Sp. Gr. above 1·8.

CLASS III.

If fluid: bituminous odour. If solid: insipid. Sp. Gr. under 1·8.

CHARACTERS OF THE ORDERS

OF

CLASS I.

I. ORDER—GAS.

Expansible. Not acid. Sp. Gr. = 0·0001...0·0014.

I. CLASS.

II. ORDER—WATER.

Liquid. Without odour or sapidity. Sp. Gr. = 1·0.

I. CLASS.

III. ORDER—ACID.

Acid. Sp. Gr. = 0·0015...3·7.

I. CLASS.

IV. ORDER—SALT.

Solid. Not acid. Sp. Gr. = 1·2...2·9.

CHARACTERS OF THE ORDERS

OF

CLASS II.

I. ORDER—HALOÏDE.*

Not metallic. Streak uncoloured.

If pyramidal, or prismatic: H. = 4·0 and less. If tessular: H. = 4·0. If single perfect and eminent faces of cleavage: Sp. Gr. = 2·4 and less.

H. = 1·5...5·0. If under 2·5: Sp. Gr. = 2·4 and less.

Sp. Gr. = 2·2...3·3. If 2·4 and less: H. under 2·5; and no resinous lustre.

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* From ἅλς, salt; and εἶδος, the appearance (*habitus*).

II. CLASS.

II. ORDER—BARYTE.

Not metallic. If adamantine or imperfect metallic lustre: Sp. Gr. = 6·0 and more. Streak uncoloured or orange-yellow. If orange-yellow: Sp. Gr. = 6·0 and more; and H. = 3·0 and less.

H. = 2·5...5·0. If 5·0: Sp. Gr. under 4·5.

Sp. Gr. = 3·3...7·2. If under 4·0; and H. = 5·0: cleavage diprismatic.

II. CLASS.

III. ORDER—KERATE.*

Not metallic. Streak uncoloured.
No single eminent cleavage.
H. = 1·0...2·0.
Sp. Gr. = 5·5...‡

* From κερας, horn.

‡ The other limit not known.

II. CLASS.

IV. ORDER—MALACHITE.

Not metallic. Colour blue, green, brown. If brown, colour or streak: H. = 3·0 and less; and Sp. Gr. above 2·5. If uncoloured streak: Sp. Gr. = 2·2 and less; and H. under 3·0.

No single eminent faces of cleavage.

H. = 2·0...5·0.

Sp. Gr. = 2·0...4·6.

II. CLASS.

V. ORDER—MICA.

If metallic: Sp. Gr. under 2·2. If not metallic: Sp. Gr. above 2·2. If yellow streak: pyramidal.

Single eminent cleavage.

H. = 1·0...4·5. If above 2·5: rhombohedral.

Sp. Gr. = 1·8...5·6. If under 2·5: metallic. If above 4·4: streak uncoloured.

II. CLASS.

VI. ORDER—SPAR.

Not metallic. Streak uncoloured...brown.

If rhombohedral: Sp. Gr. = 2·2 and less, or H. = 6·0.

H. = 3·5...7·0. If 4·0 and less: single eminent cleavage. If above 6·0: Sp. Gr. under 2·5, or above 2·8; and pearly lustre.

Sp. Gr. = 2·0...3·7. If above 3·3: hemiprismatic, or H. = 6·0; and no adamantine lustre. If 2·4 and less: not without traces of form and cleavage.

II. CLASS.

VII. ORDER—GEM.

Not metallic. Streak uncoloured.

H. = 5·5...10·0. If 6·0 and less: Sp. Gr. = 2·4 and less; and no traces of form and cleavage.

Sp. Gr. = 1·9...4·7. If under 3·8: no pearly lustre.

II. CLASS.

VIII. ORDER—ORE.

If metallic: black. If not metallic: adamantine or imperfect metallic lustre.

If yellow or red streak: H. = 3·5 and more; and Sp. Gr. = 4·8 and more. If brown or black streak: H. = 5·0 and more, or perfectly prismatoidal.

H. = 2·5...7·0. If 4·5 and less: red, yellow, or black streak. If 6·5 and more; and streak uncoloured: Sp. Gr. = 6·5 and more.

Sp. Gr. = 3·4...7·4.

II. CLASS.

IX. ORDER—METAL.

Metallic. Not black. If grey: malleable; and Sp. Gr. = 7·4 and more.

H. = 0·0...4·0, or malleable.

Sp. Gr. = 5·7...20·0.

II. CLASS.

X. ORDER—PYRITES.

Metallic.

H. = 3·5...6·5. If 4·5 and less: Sp. Gr. under 5·0.

Sp. Gr. = 4·1...7·7. If 5·3 and less: colour yellow or red.

II. CLASS.

XI. ORDER—GLANCE.

Metallic. Grey, black.
H. = 1·0...4·0.
Sp. Gr. = 4·0...7·6. If under 5·0; and single perfect cleavage: lead grey. If above 7·4: lead grey.

II. CLASS.

XII. ORDER—BLENDE.

If metallic: black. If not metallic: adamantine lustre. If brown streak...uncoloured: Sp. Gr. between 4·0 and 4·2; and the form tessular. If red streak: Sp. Gr. = 4·5 and more; and H. = 2·5 and less.

H. = 1·0...4·0.

Sp. Gr. = 3·9...8·2. If 4·3 and more: streak red.

II. CLASS.

XIII. ORDER—SULPHUR.

Not metallic. Colour red, yellow, or brown.

Prismatic.

H. = 1·0...2·5.

Sp. Gr. = 1·9...3·6. If above 2·1: streak yellow or red.

CHARACTERS OF THE ORDERS

OF

CLASS III.

I. ORDER—RESIN.

Fluid, solid. Streak uncoloured, yellow, brown, black.

H. = 0·0...2·5.

Sp. Gr. = 0·7...1·6. If 1·2 and more: Streak uncoloured.

III. CLASS.

II. ORDER—COAL.

Solid. Streak brown, black.
H. = 0·1...2·5.
Sp. Gr. = 1·2...1·5.

CHARACTERS

OF THE

GENERA AND SPECIES

OF THE

ORDERS OF CLASS I.

I. ORDER—GAS.

I. HYDROGEN GAS.

Odour. Sp. Gr. = 0·0001...0·0014.

1. PURE.

Odour of hydrogen. Sp. Gr. = 0·00012.
Hydrogen.

2. EMPYREUMATIC.

Empyreumatic odour. Sp. Gr. = 0·0008.
Carburetted Hydrogen.

3. SULPHUROUS.

Odour of putrid eggs. Sp. Gr. = 0·00135.
Hydrosulphuric Acid.

4. PHOSPHOROUS.

Odour of putrid fish. Sp. Gr. unknown.
Hydrophosphoric Acid.

II. ATMOSPHERIC GAS.

Without odour or sapidity. Sp. Gr. = 0·0010...0·0013.

1. PURE.

As above.

Atmospheric Air.

II. ORDER—WATER.

I. ATMOSPHERIC WATER.

Without odour or sapidity.

1. PURE.

As above.
Water.

III. ORDER—ACID.

I. CARBONIC ACID.

Odour and taste slightly acid. Sp. Gr. = 0·0018.

1. GASEOUS.

Expansible. Odour and taste acidulous pungent.
Carbonic Acid Gas.

II. MURIATIC ACID.

Odour pungent...taste strongly acid. Sp. Gr. = 0·0023.

1. GASEOUS.

Expansible. Odour pungent.
Muriatic Acid Gas.

III. SULPHURIC ACID.

If gaseous: odour sulphurous. If liquid: taste strongly acid. Sp. Gr. = 0·0025...1·5.

1. GASEOUS.

Expansible. Sp. Gr. = 0·0028.
Sulphurous Acid Gas.

2. LIQUID.

Liquid. Sp. Gr. = 1·4...1·5.
Sulphuric Acid.
Acide sulfurique. H*.

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* Haüy. Tableau Comparatif.

IV. BORACIC ACID.

Solid. Sp. Gr. under 3·0.

1. SCALY.

Scaly particles. Taste first acidulous, then bitter cool, and lastly sweetish.

Sassoline or Native Boracic Acid. J*. 3.

Acide boracique. H.

V. ARSENIC ACID.

Solid. Sp. Gr. above 3·0.

1. OCTAHEDRAL.

Tessular. Cleavage, octahedron. Taste sweetish astringent. H. unknown. Sp. Gr. = 3·6...3·7.

Arsenic oxidé. H.

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* Jameson—System of Mineralogy. (The number which follows refers to the edition).

IV. ORDER—SALT.

I. NATRON SALT.

Prismatic. Taste pungent, alcaline. H. = 1·0...1·5. Sp. Gr. = 1·5...1·6.

1. PRISMATIC.

Prismatic. P unknown. Cleavage, a prism.

Prismatic Natron. J. 3.
Natron or Soda. J. 2.
Natürliches Mineral Alkali. W*.
Soude carbonatée. H.

II. GLAUBER SALT.

Prismatic. Taste cool, then saline and bitter. H. = 1·5...2·0. Sp. Gr. = 2·2...2·3.

1. PRISMATIC.

Prismatic. P unknown. Cleavage, $P + \infty = 105°$ (nearly.)

Prismatic Glauber Salt. J. 3.
Glauber Salt or Sulphate of Soda. J. 2.
Natürliches Glauber Salz. W.
Soude Sulfatée. H.

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* Werner. Hoffman's Handbuch der Mineralogie, fortgestzt von Breithaupt.

III. NITRE SALT.

Prismatic. Taste, saline cool. H. = 2·0. Sp. Gr. = 1·9...2·0.

1. PRISMATIC.

Prismatic. P = 132° 22′; 91° 15′; 107° 43′. Cleavage, P + ∞ = 120°. More distinct Pr + ∞.

Prismatic Nitre. J. 3.
Nitre. J. 2.
Natürlicher Saltpeter. W.
Potasse nitratée. H.

IV. ROCK SALT.

Tessular. Taste saline. H. = 2·0. Sp. Gr. = 2·2...2·3.

1. HEXAHEDRAL.

Tessular. Cleavage, hexahedron.

Hexahedral Rock Salt. J. 3.
Rock Salt. J. 2.
Natürlich Kochsalz. W.
Soude muriatée. H.

V. AMMONIAC SALT.

Tessular. Taste pungent, urinous. H. = 1·5...2·0. Sp. Gr. = 1·5...1·6.

1. OCTAHEDRAL.

Tessular. Cleavage, octahedron.

Octahedral Sal Ammoniac. J. 3.
Sal Ammoniac, or Muriate of Ammonia. J. 2.
Natürlicher Salmiac. W.
Ammoniaque muriaté. H.

VI. VITRIOL SALT.

Pyramidal, prismatic. Taste astringent. H. = 2·0...2·5. Sp. Gr. = 1·9...2·3.

1. HEMIPRISMATIC.

Hemiprismatic. P unknown. Cleavage, a prism. Green. H. = 2·0. Sp. Gr. = 1·9...2·0.

Rhomboidal Vitriol or Green Vitriol. J. 3.
Iron Vitriol or Sulphate of Iron. J. 2.
Eisenvitriol. W.
Fer sulfaté. H.

2. PRISMATIC.

Tetarto prismatic. P unknown. Cleavage, two faces, one more distinct than the other; incidence = 124° 2′. Blue. H. = 2·5. Sp. Gr. = 2·2...2·3.

Prismatic Vitriol or Blue Vitriol. J. 3.
Blue Vitriol or Sulphate of Copper. J. 2.
Kupfervitriol. W.
Cuivre sulfaté. H.

3. PYRAMIDAL.

Pyramidal. P = 120°; 90°. Cleavage, unknown, indistinct. White. H. unknown. Sp. Gr. = 2·0.

Pyramidal Vitriol or White Vitriol. J. 3.
White Vitriol or Sulphate of Zink. J. 2.
Zinkvitriol. W.
Zinc sulfaté. H.

VII. EPSOM SALT.

Prismatic. Taste saline-bitter. H. unknown. Sp. Gr. unknown.

1. PRISMATIC.

Prismatic. P unknown. Cleavage, prismatoidal perfect.

Prismatic Epsom Salt. J. 3.
Epsom Salt. J. 2.
Natürliches Bittersalz. W.
Magnésie Sulfatée. H.

VIII. ALUM-SALT.

Tessular. Taste sweetish astringent. H. = 2·0...2·5. Sp. Gr. = 1·7...1·8.

1. OCTAHEDRAL.

Tessular. Cleavage, octahedron.

Octahedral Alum. J. 3.
Alum. J. 2.
Natürlicher Alaun. W.
Alumine sulfatée alcaline. H.

IX. BORAX-SALT.

Prismatic. Taste sweetish, feebly alcaline. H. = 2·0...2·5. Sp. Gr. = 1·5...1·7.

1. PRISMATIC.

Hemiprismatic. P = 152° 9′; 120° 23′; 67° 3′. $\frac{P}{2}$ = 120° 23′. P + ∞ = 52° 53′. Cleavage, $(\breve{P}r + \infty)^3$ = 88° 9′. More distinct $\breve{P}r + \infty$.

Prismatic Borax. J. 3.
Borax. J. 2.
Soude boratée. H.

X. BRITHYNE*-SALT.

Prismatic. Taste saline, feebly astringent. H. = 2·5...3·0. Sp. Gr. = 2·7...2·9.

1. PRISMATIC.

Hemiprismatic. P unknown. Cleavage, $\frac{\bar{P}r}{2}$, perfect. Indistinct $P + \infty = 104° 28'$.

Glauberite. J. 3.
Glauberite. J. 2.
Glaubérite. H.

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* From βριθὺς, dense (heavy).

CHARACTERS

OF THE

GENERA AND SPECIES

OF THE

ORDERS OF CLASS II.

I. ORDER—HALOÏDE.

I. GYPSUM-HALOÏDE.

Prismatic. H. = 1·5...3·5. Sp. Gr. = 2·2...3·0. If above 2·5: cleavage in three directions, perpendicular to each other, one less distinct.

1. PRISMATOIDAL.

Hemiprismatic. P = 149° 33′; 135° 32′; 54° 52′. $\frac{P}{2}$ = 149° 33′. P + ∞ = 110° 30′. Cleavage, $\frac{\bar{Pr}}{2}$. $\bar{Pr} + \infty$ (inclination of $\frac{\bar{Pr}}{2}$ to $\bar{Pr} + \infty$ = 113° 6′). More distinct and eminent, $\breve{Pr} + \infty$. H. = 1·5...2·0. Sp. Gr. = 2·2...2·4.

Axifrangible Gypsum. J. 3.
Gypsum. J. 2.
Gyps. Fraueneis. W.
Chaux sulfatée. H.

2. PRISMATIC.

Prismatic. P = 121° 32′; 108° 35′; 99° 7′. Cleavage, P — ∞. Perfect $\breve{P}r + \infty$. $\bar{P}r + \infty$. Traces of P + ∞ = 100° 8′. H. = 3·0...3·5. Sp. Gr. = 2·7...3·0.

Prismatic Gypsum, or Anhydrite. J. 3.
Anhydrite. Vulpinite. J. 2.
Muriazit. W.
Chaux anhydro-sulfatée. H.

II. CRYONE-HALOÏDE.

Prismatic. Cleavage in three directions, perpendicular to each other, one more distinct. H. = 2·5...3·0. Sp. Gr. = 2·9...3·0.

1. PRISMATIC.

Prismatic. P unknown. Cleavage, P — ∞. Less distinct, $\breve{P}r + \infty$. $\bar{P}r + \infty$. Traces of P.

Pyramidal Cryolite. J. 3.
Cryolite. J. 2.
Kryolith. W.
Alumine fluatée alcaline. H.

III. ALUM-HALOÏDE.

Rhombohedral. H. = 5·0. Sp. Gr. = 2·4...2·6.

1. RHOMBOHEDRAL.

Rhombohedral. R unknown. Cleavage, R — ∞. R.

Rhomboidal Alum-Stone. J. 3.
Alum-Stone. J. 2.
Alaunstein. W.
Lave altérée alunifère. H.

IV. FLUOR-HALOÏDE.

Tessular, rhombohedral. Cleavage, no rhombohedron. H. = 4·0...5·0. Sp. Gr. = 3·0...3·3.

1. OCTAHEDRAL.

Tessular. Cleavage, octahedron perfect. Hexahedron, dodecahedron imperfect. H. = 4·0.

Octahedral Fluor. J. 3.
Fluor. J. 2.
Fluss. W.
Chaux fluatée. H.

2. †* RHOMBOHEDRAL.

Dirhombohedral. 2 R = 131° 14′; 111° 20′. Cleavage, R — ∞. P + ∞. H. = 5·0.

Rhomboidal Apatite. J. 3.
Apatite. Phosphorite. J. 2.
Apatit. Spargelstein. Phosphorit. W.
Chaux phosphatée. H.

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* The dimensions of the species marked thus (†) have been determined by means of Dr Wollaston's Reflecting Gonyometer.

V. CALC-HALOÏDE.

Rhombohedral, prismatic. Cleavage, rhombohedron, prismatoidal. H. = 3·0...4·5. If above 4·0: Sp. Gr. = 2·8 and more. Sp. Gr. = 2·5...3·2.

1. PRISMATIC.

Prismatic. P = 113° 44′; 93° 43′; 122° 10′. $P + \infty$ = 105° 23′. Cleavage, $\bar{Pr} - 1$ = 109° 28′. $(\breve{Pr} + \infty)^3$ = 64° 4′. More distinct $\bar{Pr} + \infty$. H. = 3·5...4·0. Sp. Gr. = 2·6...3·0.

Prismatic Limestone, or Arragonite. J. 3.
Arragonite. J. 2.
Arragon. W.
Arragonite. H.

2. † RHOMBOHEDRAL.

Rhombohedral. R = 105° 5′. Cleavage, R*. H. = 3·0. Sp. Gr. = 2·5...2·8.

Limestone. J. 3.
Slate-Spar. Agaric Mineral or Rock Milk.
Chalk. Limestone. Lucullite. Marl. Bituminous Marl-Slate. J. 2.
Bergmilch. Kreide. Kalkstein. Kalktuff. Schieferspath. Stinkstein. Anthrakolith. Mergel. Duttenstein. Bituminöser Mergelschiefer. W.
Chaux carbonatée. H.

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* It has been often mentioned, that cleavage is also found parallel to the faces of $R - \infty$, $R - 1$, and others. The smooth faces, however, which in breaking the mineral, appear in these directions, are not cleavage, as has been shewn by Dr Brewster, but faces of composition.

3. † MACROTYPOUS*.

Rhombohedral. R = 106° 15′. Cleavage, R. H. = 3·5...4·0. Sp. Gr. = 2·8...2·95.

Rhomb-Spar. J. 3.
Dolomite. Miemite. Brown Spar or Pearl Spar. Gurhofite. J. 2.
Braunspath. Dolomit. Rautenspath. W.
Chaux carbonatée ferrifère perlée. Chaux carbonatée magnésifère. H.

4. † BRACHYTYPOUS§.

Rhombohedral. R = 107° 22′. Cleavage, R. H. = 4·0...4·5. Sp. Gr. = 3·0...3·2.

Dolomite. J. 3.
Dolomite. J. 2.
Rautenspath. W.
Chaux carbonatée magnésifère. H.

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* From μακρὸς, long, and τύπος, the type (fundamental form.)
§ From βραχὺς, short, and τύπος.

II. ORDER—BARYTE.

I. PARACHROSE*-BARYTE.

Rhombohedral. Cleavage, rhombohedron. H. = 3·5...4·5. Sp. Gr. = 3·3...3·9.

1. † BRACHYTYPOUS.

Rhombohedral. R = 107°. Cleavage, R. H. = 3·5...4·5. Sp. Gr. = 3·6...3·9.

Sparry Iron. J. 3.
Sparry Ironstone. J. 2.
Spatheisenstein. W.
Fer oxydé carbonaté. H.

2. † MACROTYPOUS.

Rhombohedral. R = 106° 51′. Cleavage, R. H. = 3·5. Sp. Gr. = 3·3...3·6.

Rhomboidal Red Manganese. J. 3.
Red Manganese Ore. J. 2.
Rother Braunstein. Braunspath. W.
Manganèse oxydé carbonaté. H.

II. ZINC-BARYTE.

Rhombohedral, prismatic. If rhombohedral: Sp. Gr. above 4·0. H. = 5·0. Sp. Gr. = 3·3...4·5.

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* From παράχρωσις, alteration of colour.

1. PRISMATIC.

Prismatic. P = 134° 59′; 99° 56′; 96° 56′. P + ∞ = 118° 29′. Cleavage, $\breve{Pr}$ = 120°. More distinct $(\breve{Pr} + \infty)^3$ = 80° 4′. H. = 5·0. Sp. Gr. = 3·3...3·6.

Prismatic Calamine. J. 3.
Electric Calamine or Siliceous Oxide of Zinc. J. 2.
Galmei. W.
Zinc oxydé. H.

2. RHOMBOHEDRAL.

Rhombohedral. R = 110° (nearly). Cleavage, R. H. = 5·0. Sp. Gr. = 4·2...4·5.

Rhomboidal Calamine. J. 3.
Calamine. J. 2.
Galmei. W.
Zinc carbonaté. H.

III. SCHEELIUM-BARYTE.

Pyramidal. H. = 4·0...4·5. Sp. Gr. = 6·0...6·1.

1. PYRAMIDAL.

Pyramidal. P = 107° 26′; 113° 36′. Cleavage, P. P + 1 = 100° 8′; 130° 20′. P — ∞.

Pyramidal Tungsten. J. 3.
Tungsten. J. 2.
Schwerstein. W.
Schéelin calcaire. H.

IV. HAL-BARYTE.

Prismatic. H. = 3·0...3·5. Sp. Gr. = 3·6...4·6.

1. † PYRAMIDO-PRISMATIC.

Prismatic. P unknown. Cleavage, $P\breve{r}$. $P+\infty = 117° \; 19'$. $P\breve{r}+\infty$. H. = 3·5. Sp. Gr. = 3·6...3·8.

Diprismatic Baryte or Strontianite. J. 3.
Strontianite. J. 2.
Strontian. W.
Strontiane carbonatée. H.

2. DIPRISMATIC.

Prismatic. P unknown. Cleavage, $P\breve{r}$. $P+\infty = 120°$ (nearly). $P\breve{r}+\infty$. H. = 3·0...3·5. Sp. Gr. = 4·2...4·4.

Rhomboidal Baryte or Witherite. J. 3.
Witherite. J. 2.
Witherit. W.
Baryte carbonatée. H.

3. PRISMATIC.

Prismatic. P = 128° 54′; 91° 20′; 110° 25′. $P+\infty = 101° \; 59'$. Cleavage, $P\bar{r} = 78° \; 28'$. $P\breve{r}+\infty$. Less distinct $P-\infty$. $P\bar{r}+\infty$. H. = 3·0...3·5. Sp. Gr. = 4·1...4·6.

Prismatic Baryte or Heavy Spar. J. 3.
Heavy Spar. Hepatite. J. 2.
Schwerspath. W.
Baryte sulfatée. H.

4. PRISMATOIDAL.

Prismatic. P = 128° 14′; 113° 26′; 90° 57′. P + ∞ = 115° 42′. Cleavage, P̄r = 104° 48′. More distinct P̆r + ∞. Less distinct P — ∞. P̄r + ∞. H. = 3·0...3·5. Sp. Gr. = 3·6...4·0.

Axifrangible Baryte or Celestine. J. 3.
Celestine. J. 2.
Cölestin. W.
Strontiane sulfatée. H.

V. LEAD-BARYTE.

Rhombohedral, pyramidal, prismatic. H. = 2·5...4·0. If above 3·5: Sp. Gr. = 6·5 and more. Sp. Gr. = 6·0 ...7·2.

1. † DIPRISMATIC.

Prismatic. P = 130° 0′; 108° 28′; 92° 19′. P + ∞ = 108° 16′. Cleavage, P̆r = 117° 13′. $(\breve{P}r + \infty)^3$ = 69° 20′. H. = 3·0...3·5. Sp. Gr. = 6·3...6·6.

Diprismatic Lead-Spar. J. 3.
White Lead-Ore. Black Lead-Ore. J. 2.
Weis-Bleierz. Schwarz-Bleierz. W.
Plomb carbonaté. H.

2. RHOMBOHEDRAL.

Dirhombohedral. R = 117° 23′. Cleavage, P + 1 = 141° 47′; 81° 46′. H. = 3·5...4·0. Sp. Gr. = 6·9...7·2.

Rhomboidal Lead-Spar. J. 3.
Green Lead-Ore. Brown Lead-Ore. J. 2.
Grün-Bleierz. Braun-Bleierz. W.
Plomb phosphaté. H.

3. HEMIPRISMATIC.

Hemiprismatic. P unknown. Cleavage, $P + \infty = 90°$ (nearly). $\breve{P}r + \infty$. $\bar{P}r + \infty$. H. $= 2{\cdot}5$. Sp. Gr. $= 6{\cdot}0 \ldots 6{\cdot}1$.

Prismatic Lead-Spar or Red Lead-Spar. J. 3.
Red Lead-Ore or Chromate of Lead. J. 2.
Roth-Bleierz. W.
Plomb chromaté. H.

4. † PYRAMIDAL.

Pyramidal. $P = 99° 40'; 131° 35'$. Cleavage, $P - \infty$. P. H. $= 3{\cdot}0$. Sp. Gr. $= 6{\cdot}5 \ldots 6{\cdot}9$.

Pyramidal Lead-Spar or Yellow Lead-Spar. J. 3.
Yellow Lead-Ore or Molybdate of Lead. J. 2.
Gelb-Bleierz. W.
Plomb molybdaté. H.

5. PRISMATIC.

Prismatic. $P = 122° 35'; 94° 25'; 112° 37'$. $P + \infty = 109° 28'$. Cleavage, $\bar{P}r = 78° 28'$. More distinct $\breve{P}r + \infty$. H. $= 3{\cdot}0$. Sp. Gr. $= 6{\cdot}2 \ldots 6{\cdot}3$.

Triprismatic Lead-Spar or Sulphate of Lead. J. 3.
Sulphate of Lead or Lead-Vitriol. J. 2.
Vitriol-Bleierz. W.
Plomb sulfaté. H.

III. ORDER—KERATE.

I. PEARL-KERATE.

Tessular, pyramidal. H. = 1·0...2·0. Sp. Gr. = 5·5...

1. HEXAHEDRAL.

Tessular. Cleavage, none. Malleable. Sp. Gr. = 5·5...5·6.

Hexahedral Corneous Silver. J. 3.
Corneous Silver-Ore or Horn-Ore. J. 2.
Hornerz. W.
Argent muriaté. H.

2. PYRAMIDAL.

Pyramidal. P unknown. Cleavage, P + ∞, imperfect. Sectile. Sp. Gr. unknown.

Pyramidal Corneous Mercury. J. 3.
Mercurial Horn-Ore or Corneous Mercury. J. 2.
Quecksilber-Hornerz. W.
Mercure muriaté. H.

IV. ORDER—MALACHITE.

I. STAPHYLINE*-MALACHITE.

Uncleavable. H. = 2·0...3·0. Sp. Gr. = 2·0...2·2.

1. UNCLEAVABLE‡.

Uncleavable. Reniform, botryoidal, massive. Streak uncoloured.

Common Copper-Green. J. 3.
Copper-Green. Ironshot Copper-Green. J. 2.
Kupfergrün. Eisenschüssig Kupfergrün. W.
Cuivre carbonaté. H.

II. LIROCONE§-MALACHITE.

Tessular, prismatic. H. = 2·5. Sp. Gr. = 2·8...3·0.

1. PRISMATIC.

Prismatic. P unknown. Cleavage, $\bar{Pr}$. P + ∞. Streak pale verdigris-green...sky-blue. H. = 2·5. Sp. Gr. = 2·8...3·0.

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* From σταφυλή, grape.

‡ This expression has only been used when there was nothing at all known of the form.

§ From λειρὸς, pale, and κονία, the dust (the streak).

Diprismatic Olivenite or Lenticular Copper. J. 3.
Lenticular Copper-Ore. J. 2.
Linsenerz. W.
Cuivre arseniaté. H.

2. HEXAHEDRAL.

Tessular. Cleavage, hexahedron. Streak pale olive-green...brown. H. = 2·5. Sp. Gr. = 2·9...3·0.

Hexahedral Olivenite or Cube Ore. J. 3.
Cube-Ore or Arseniate of Iron. J. 2.
Würfelerz. W.
Fer arseniaté. H.

III. OLIVE-MALACHITE.

Prismatic. Colour or streak neither blue nor bright green. H. = 3·0...4·0. Sp. Gr. = 3·6...4·6.

1. PRISMATIC.

Prismatic. P unknown. Cleavage, $P + \infty$. Streak olive-green ...brown. H. = 3·0. Sp. Gr. = 4·2...4·6.

Acicular Olivenite. J. 3.
Oliven-Ore or Olive Copper-Ore. J. 2.
Olivenerz. W.
Cuivre arseniaté. H.

2. DIPRISMATIC.

Prismatic. P unknown. Cleavage, unknown. Streak olive-green. H. = 4·0. Sp. Gr. = 3·6...3·8.

Olivenerz. W. *(Commonly called Phosphor-Kupfer from Libethen.)*

IV. AZURE-MALACHITE.

Prismatic. Blue. H. = 3·5...4·0. Sp. Gr. = 3·5... 3·7.

1. PRISMATIC.

Hemiprismatic. P unknown. Cleavage, a prism. Streak blue.

Blue Copper or Prismatic Malachite. J. 3.
Azure Copper-Ore. J. 2.
Kupferlasur. W.
Cuivre carbonaté bleu. H.

V. EMERALD-MALACHITE.

Rhombohedral. H. = 5·0. Sp. Gr. = 3·3...3·4.

1. RHOMBOHEDRAL.

Rhombohedral. R = 123° 58′. Cleavage, R. Streak green.

Rhomboidal Emerald-Copper. J. 3.
Emerald Copper-Ore. J. 2.
Kupferschmaragd. W.
Cuivre dioptase. H.

VI. HABRONEME*-MALACHITE.

Prismatic. Colour or streak bright green. H. = 3·5... 5·0. Sp. Gr. = 3·5...4·3.

1. PRISMATIC.

Prismatic. P unknown. Cleavage, P + ∞ = 110° (nearly). Streak emerald-green. H. = 5·0. Sp. Gr. = 4·0...4·3.

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* From ἁβρὸς, fine, thin, and νῆμα, a thread (fibre).

Prismatic Olivenite or Phosphate of Copper. J. 3.
Phosphate of Copper. J. 2.
Phosphor-Kupfererz. W.
Cuivre phosphaté. H.

2. DIPRISMATIC.

Prismatic. P unknown. Cleavage, $\bar{Pr}$. $P + \infty = 103°$ (nearly). Streak grass...apple-green. H. = 3·5...4·0. Sp. Gr. = 3·5...3·7.

Common or Acicular Malachite. J. 3.
Malachite. J. 2.
Malachit. W.
Cuivre carbonaté vert. H.

V. ORDER—MICA.

I. EUCHLORE *-MICA.

Pyramidal, prismatic. Streak green...yellow. If green: Sp. Gr = 2·6 and less, or = 3·0 and more. H. = 1·0...2·5. Sp. Gr. = 2·5...3·2.

1. HEMIPRISMATIC.

Hemiprismatic. P unknown. $\frac{\bar{P}}{2}$. Cleavage, $\bar{Pr} + \bar{\infty}$. Streak emerald...apple-green. H. = 2·0. Sp. Gr. = 2·5...2·6.

Prismatic Copper-Mica. J. 3.
Copper-Mica. J. 2.
Kupferglimmer. W.
Cuivre arseniaté. H.

2. PRISMATIC.

Prismatic. P unknown. Cleavage, P — ∞. Streak pale apple-green. H. = 1·0...1·5. Sp. Gr. = 3·0...3·2.

Kupferschaum. W.

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* From εὔχλωρος, bright green.

3. PYRAMIDAL.

Pyramidal. P = 95° 13′; 144° 56′. Cleavage, P — ∞. Streak green...yellow. H. = 2·0...2·5. Sp. Gr. = 3·0...3·2.

Pyramidal Uranite. J. 3.
Uran-Mica. J. 2.
Uranglimmer. W.
Urane oxydé. H.

II. ANTIMONY-MICA.

Prismatic. H. = 1·5...2·0. Sp. Gr. = 5·0...5·6.

1. PRISMATIC.

Prismatic. Cleavage, prismatoidal. Streak uncoloured.

Prismatic White Antimony. J. 3.
White Antimony-Ore. J. 2.
Weis-Spiesglaserz. W.
Antimoine oxydé. H.

III. COBALT-MICA.

Prismatic. H. = 2·5. Sp. Gr. = 4·0...4·3.

1. PRISMATIC.

Hemiprismatic. P unknown. $\frac{\bar{P}}{2}$. Cleavage, $\breve{Pr} + \infty$. Streak red...green.

Prismatic Red Cobalt. J. 3.
Red Cobalt-Ochre. J. 2.
Rother Erdkobold. W.
Cobalt arseniaté. H.

IV. IRON-MICA.

Prismatic. Streak uncoloured...blue. H. = 2·0. Sp. Gr. = 2·6...2·7.

1. PRISMATIC.

Hemiprismatic. P unknown. $\frac{\bar{P}}{2}$. Cleavage, $\breve{P}r + \infty$.

Prismatic Blue Iron. J. 3.
Blue Iron Ore. J. 2.
Vivianit. Blaue Eisenerde. W.
Fer phosphaté. H.

V. GRAPHITE-MICA.

Rhombohedral. H. = 1·0...2·0. Sp. Gr. = 1·8...2·1.

1. RHOMBOHEDRAL.

Dirhombohedral. R unknown. Cleavage, R − ∞. Metallic. Streak black.

Rhomboidal Graphite. J. 3.
Graphite. J. 2.
Graphit. W.
Graphite. H.

VI. TALC-MICA.

Rhombohedral, prismatic. Streak uncoloured...green. H. = 1·0...2·5. Sp. Gr. = 2·7...3·0.

1. PRISMATIC.

Prismatic. P unknown. P + ∞ = 120° (nearly). Cleavage, P − ∞. Flexible. H. = 1·0...1·5. Sp. Gr. = 2·7...2·8.

Rhomboidal Mica. J. 3.
Chlorite. Potstone or Lapis Ollaris. Talc. J. 2.
Chlorit. Talk. Topfstein. W.
Talc. H.

2. RHOMBOHEDRAL.

Dirhombohedral. R unknown. Cleavage, R − ∞. Elastic. H. = 2·0...2·5. Sp. Gr. = 2·8...3·0.

Rhomboidal Mica. J. 3.
Lepidolite. Mica. J. 2.
Lepidolith. Glimmer. W.
Mica. Lepidolite. H.

VII. PEARL-MICA.

Rhombohedral. H. = 3·5...4·5. Sp. Gr. = 3·0...3·1.

1. RHOMBOHEDRAL.

Dirhombohedral. R unknown. Cleavage, R − ∞. Streak uncoloured.

Rhomboidal Pearl-Mica. J. 3.

VI. ORDER—SPAR.

I. SCHILLER-SPAR.

Prismatic. Single eminent faces of cleavage. H. = 3·5...6·0. If = 6·0: lustre metallic-pearly. Sp. Gr. = 2·6...3·4.

1. DIATOMOUS*.

Prismatic. P unknown. Cleavage, prismatoidal. H. = 3·5...4·0. Sp. Gr. = 2·6...2·8.

Schiller-Spar. J. 3.
Schiller-Spar. J. 2.
Schillerstein. W.
Diallage metalloïde. H.

2. AXOTOMOUS §.

Prismatic. P unknown. Cleavage, P — ∞. Common pearly lustre. H. = 4·5...5·5. Sp. Gr. = 3·0...3·2.

Green Diallage. J. 3.
Diallage. J. 2.
Körniger Strahlstein. W.
Diallage verte. H.

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* From διὰ, through, and τέμνω, I cut. (Cleavage very distinct in one direction.)

§ From ἄξων, the axis, and τέμνω, I cut. (Cleavage perpendicular to the axis.)

3. HEMIPRISMATIC.

Hemiprismatic. P unknown. Cleavage $\frac{\bar{Pr}}{2}$. $\bar{Pr} + \infty$. Perfect $\breve{Pr} + \infty$. Lustre metallic-pearly. H. = 4·0...5·0. Sp. Gr. = 3·0 ...3·3.

Schiller-Spar. J. 3.
Bronzite. J. 2.
Blättriger Anthophyllit. W.
Diallage métalloïde. H.

4. PRISMATOIDAL.

Prismatic. P unknown. Cleavage, $P + \infty = 100°$ (nearly). $\bar{Pr} + \infty$. Perfect $\breve{Pr} + \infty$. Lustre metallic-pearly. H. = 6·0. Sp. Gr. = 3·3...3·4.

Hyperstene or Labrador Schiller-Spar. J. 3.
Hyperstene. J. 2.
Paulit. W.
Hypersthène. H.

5. PRISMATIC.

Prismatic. P unknown. Cleavage, $P + \infty = 106°$ (nearly). $\breve{Pr} + \infty$. Perfect $\bar{Pr} + \infty$. Lustre almost metallic-pearly. H. = 5·0 ...5·5. Sp. Gr. = 3·0...3·3.

Anthophyllite. J. 3.
Anthophyllite. J. 2.
Strahliger Anthophyllit. W.
Anthophyllite. H.

II. DISTHENE-SPAR.

Prismatic. H. = 5·0...7·0. Sp. Gr. = 3·5...3·7.

1. PRISMATIC.

Tetartoprismatic. P unknown. Cleavage, two faces, the one more distinct than the other. Incidence = 102° 50′.

Prismatic Kyanite. J. 3.
Kyanite or Cyanite. J. 2.
Rhätizit. Zianit. W.
Disthène. H.

III. TRIPHANE-SPAR.

Prismatic. One cleavage somewhat more distinct. No blue colour. H. = 6·0...7·0. Sp. Gr. = 2·8...3·1.

1. PRISMATIC.

Prismatic. P unknown. Cleavage, $P + \infty$ = 100° (nearly). Somewhat more distinct $\breve{P}r + \infty$. H. = 6·5...7·0. Sp. Gr. = 3·0 ...3·1.

Prismatic Spodumene. J. 3.
Spodumene. J. 2.
Spodumen. W.
Triphane. H.

2. AXOTOMOUS.

Prismatic. P unknown. Cleavage, $P + \infty$ = 103° (nearly). More distinct $P - \infty$. H. = 6·0...7·0. Sp. Gr. = 2·8...3·0.

Prismatic Prehnite. J. 3.
Prehnite. J. 2.
Prehnit. W.
Prehnite. H.

IV. DYSTOME*-SPAR.

Prismatic. Lustre of the fracture resinous. Colour not blue. H. = 5·0...5·5. Sp. Gr. = 2·9...3·0.

1. PRISMATIC.

Hemiprismatic. P = 129° 1′; 105° 2′; 96° 23′. $\frac{P}{2}$ = 129° 1′. Cleavage, P + ∞ = 109° 28′ imperfect.

Prismatic Datolite. J. 3.
Datolite. J. 2.
Datholit. W.
Chaux boratée siliceuse. H.

V. KOUPHONE§-SPAR.

Tessular, rhombohedral, pyramidal, prismatic. If the most distinct cleavage be parallel to a rectangular prism: Sp. Gr. = 2·4 and less. H. = 3·5...6·0. Sp. Gr. = 2·0 ...2·5.

1. TRAPEZOIDAL.

Tessular. Cleavage, hexahedron, dodecahedron, imperfect. H. = 5·5...6·0. Sp. Gr. = 2·4...2·5.

Dodecahedral Zeolite or Leucite. J. 3.
Leucite. J. 2.
Leuzit. W.
Amphigène. H.

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* From δύστομος, difficult to cleave.
§ From κοῦφος, light.

2. DODECAHEDRAL.

Tessular. Cleavage, dodecahedron, perfect. H. = 5·5...6·0. Sp. Gr. = 2·2...2·4.

Sodalite. J. 3.
Sodalite. J. 2.

3. HEXAHEDRAL.

Tessular. Cleavage, hexahedron, imperfect. H. = 5·5. Sp. Gr. = 2·0...2·2.

Hexahedral Zeolite or Analcime. J. 3.
Cubicite. J. 2.
Analzim. W.
Analcime. H.

4. PYRAMIDO-PRISMATIC.

Prismatic. P unknown. Cleavage, P. $\breve{Pr}+\infty$. $\bar{Pr}+\infty$. H. = 4·5. Sp. Gr. = 2·3...2·4.

Pyramidal Zeolite or Cross-Stone. J. 3.
Cross-stone. J. 2.
Kreuzstein. W.
Harmotome. H.

5. RHOMBOHEDRAL.

Rhombohedral. R = 93° 48′. Cleavage, R. H. = 4·0...4·5. Sp. Gr. = 2·0...2·1.

Rhomboidal Zeolite or Chabasite. J. 3.
Chabasite. J. 2.
Schabasit. W.
Chabasie. H.

6. DIATOMOUS.

Hemiprismatic. $P = 129° \; 7'$; $120° \; 48'$; $81° \; 6'$. $\frac{P}{2} = 120° \; 48'$. $P + \infty = 98° \; 13'$. Cleavage, $\bar{Pr} + \infty$. More distinct $\breve{Pr} + \infty$. H. unknown. Sp. Gr. = 2·3...2·4.

Diprismatic Zeolite or Laumonite. J. 3.
Laumonite. J. 2.
Lomonit. W.
Laumonite. H.

7. † PRISMATIC.

Prismatic. P unknown. Cleavage, $P + \infty = 91° \; 25'$. H. = 5·0 ...5·5. Sp. Gr. = 2·0...2·3.

Prismatic Zeolite or Mesotype. J. 3.
Natrolite. Fibrous Zeolite. J. 2.
Natrolith. Fascrzeolith. W.
Mésotype. H.

8. PRISMATOIDAL.

Prismatic. $P = 123° \; 33'$; $112° \; 16'$; $93° \; 7'$. $P + \infty = 99° \; 22'$. Cleavage, $\breve{Pr} + \infty$, eminent. H. = 3·5...4·0. Sp. Gr. = 2·0...2·2.

Prismatoidal Zeolite or Stilbite. J. 3.
Radiated Zeolite. J. 2.
Strahlzeolith. W.
Stilbite. H.

9. HEMIPRISMATIC.

Hemiprismatic. P unknown. $\frac{\bar{P}}{2}$. Cleavage, $\breve{Pr} + \infty$ eminent. H. = 3·5...4·0. Sp. Gr. = 2·0...2·2.

Prismatoidal Zeolite or Stilbite. J. 3.
Foliated Zeolite. J. 2.
Blätterzeolith. W.
Stilbite. H.

10. PYRAMIDAL.

Pyramidal. P unknown. Cleavage, $P-\infty$ eminent. $[P+\infty]$ imperfect. $H=4{\cdot}5\ldots5{\cdot}0$. Sp. Gr. $=2{\cdot}2\ldots2{\cdot}5$.

Axifrangible Zeolite or Apophyllite. J. 3.
*Apophyllite**. J. 2.
Albin. Ichthyophthalm. W.
Apophyllite. Mesotype épointée. H.

VI. PETALINE-SPAR.

Prismatic. H. $=6{\cdot}0\ldots6{\cdot}5$. Sp. Gr. $=2{\cdot}4\ldots2{\cdot}5$.

1. PRISMATIC.

Prismatic. P unknown. Cleavage, $P+\infty=137°\ 8'$. $\breve{P}r+\infty$.

Petalite. Arfvedson.

VII. FELD-SPAR.

Rhombohedral, pyramidal, prismatic. Not eminently axotomous. H. $=5{\cdot}0\ldots6{\cdot}0$. Sp. Gr. $=2{\cdot}5\ldots2{\cdot}8$. If $2{\cdot}7$ and more: cleavage, a rectangular prism.

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* The genus Kouphone-Spar would contain one species more, if the forms of Apophyllite were to prove prismatic.

1. RHOMBOHEDRAL.

Dirhombohedral. $2R = 152° 44'$; $56° 15'$. Cleavage, $R - \infty$. $R + \infty$. H. = 6·0. Sp. Gr. = 2·5...2·6.

Rhomboidal Felspar or Nepheline. J. 3.
Nepheline. J. 2.
Nephelin. W.
Népheline. H.

2. PRISMATIC.

Hemiprismatic. $P = 134° 26'$; $126° 52'$; $72° 32'$. $\frac{P}{2} = 126° 52'$. $P + \infty = 81° 47'$. Cleavage, $\frac{\breve{Pr}}{2}$. $\bar{Pr} + \infty$. Both perfect. Less distinct $(\breve{Pr} + \infty)^3 = 120°$, sometimes only one of its faces. H. = 6·0. Sp. Gr. = 2·5...2·8.

Prismatic Felspar. J. 3.
Felspar. Ice-Spar. Clinkstone. J. 2.
Feldspath. Eisspath. Klingstein. W.
Feldspath. H.

3. † PYRAMIDAL.

Pyramidal. $P = 136° 7'$; $63° 48'$. Cleavage, $P - \infty$. Perfect, $P + \infty$. $[P + \infty]$. H. = 5·0...5·5. Sp. Gr. = 2·5...2·8.

Pyramidal Felspar or Scapolite. Prismato-pyramidal Felspar or Meionite. J. 3.
Meionite. Scapolite. J. 2.
Mejonit. Skapolith. Schmelzstein. W.
Paranthine. Wernerite. Meïonite. Dipyre. H.

VIII. AUGITE-SPAR.

Prismatic. Lustre not metallic-pearly. H. = 4·5...7·0. If above 6·0: Sp. Gr. = 3·2 and more. Sp. Gr. = 2·7...3·5. If under 3·2: cleavage, oblique-angular prisms, perfect.

1. PYRAMIDO-PRISMATIC.

Hemiprismatic. $P = 152° 12'$; $120°$; $61° 2'$. $\frac{P}{2} = 120°$. $P + \infty = 51° 19'$. Cleavage, $(\breve{P}r + \infty)^3 = 87° 42'$. $\breve{P}r + \infty$. $\bar{P}r + \infty$. Sometimes $\frac{\breve{P}}{2}$. H. = 5·0...6·0. Sp. Gr. = 3·2...3·5.

Oblique-edged Augite. J. 3.
Actynolite. Sahlite. Augite. Diopside. J. 2.
Kokkolith. Augit. Baikalit. Sahlit. Diopsit. Fassait. Omphazit. Strahlstein. Asbest. W.
Pyroxène. H.

2. HEMIPRISMATIC.

Hemiprismatic. $P = 151° 8'$; $148° 39'$; $42° 22'$. $\frac{P}{2} = 148° 39'$. $P + \infty = 87° 11'$. Cleavage, $(\breve{P}r + \infty)^3 = 124° 34'$. Less distinct, $\bar{P}r + \infty$. $\breve{P}r + \infty$. H. = 5·0...6·0. Sp. Gr. = 2·7...3·2.

Straight-edged Augite. J. 3.
Hornblende. Actynolite. Tremolite. J. 2.
Karinthin. Kalamit. Hornblende. Asbest. Strahlstein. Tremolith. W.
Amphibole. H.

3. PRISMATOIDAL.

Hemiprismatic. P unknown. Cleavage, two faces, the one more distinct than the other. Incidence = 114° 37′. H. = 6·0...7·0. Sp. Gr. = 3·2...3·5.

Prismatoidal Augite. J. 3.
Epidote or Pistacite, Zoïsite. J. 2.
Pistazit. Zoisit. W.
Epidote. H.

4. PRISMATIC.

Prismatic. P unknown. Cleavage, $P + \infty = 105°$ (nearly). $\breve{P}r + \infty$. $\bar{P}r + \infty$. H. = 4·5...5·0. Sp. Gr. = 2·7...2·9.

Prismatic Augite or Tabular Spar. J. 3.
Tabular-Spar. J. 2.
Schaalstein. W.
Spàth en Tables. H.

IX. AZURE-SPAR.

Prismatic. Blue. H. = 5·0...6·0. Sp. Gr. = 3·0...3·1.

1. PRISMATIC.

Prismatic. P unknown. Cleavage, $P + \infty$. Colour lively. H. = 5·0...5·5.

Prismatic Azure-Spar. J. 3.
Azurite. J. 2.
Lazulith. W.
Lazulite. H.

2. PRISMATOIDAL.

Prismatic. P unknown. Cleavage, prismatoidal. Colour pale. H. = 5·5...6·0.

Prismatoidal Azure-Spar or Blue-Spar. J. 3.
Blue-Spar. J. 2.
Blauspath. W.
Feldspath bleu. H.

VII. ORDER—GEM.

I. ANDALUSITE.

Prismatic. Cleavage, not prismatoidal. H. = 7·5. Sp. Gr. = 3·0...3·2.

1. PRISMATIC.

Prismatic. P unknown. Cleavage, P + ∞. $\breve{P}r + \infty$. $\bar{P}r + \infty$.

Prismatic Andalusite. J. 3.
Andalusite. J. 2.
Andalusit. W.
Feld-spath apyre. H.

II. CORUNDUM.

Tessular, rhombohedral, prismatic. If prismatic: Sp. Gr. = 3·7 and more, and H. = 8·5. If colour red, and Sp. Gr. = 3·7 and more: H. = 9·0. H. = 8·0...9·0. Sp. Gr. = 3·5...4·3.

1. DODECAHEDRAL.

Tessular. Cleavage, octahedron, imperfect. H. = 8·0. Sp. Gr. = 3·5...3·8.

Octahedral Corundum. J. 3.
Spinel. Ceylanite. J. 2.
Spinel. Zeilanit. W.
Spinelle. H.

2. OCTAHEDRAL.

Tessular. Cleavage, octahedron, perfect. H. = 8·0. Sp. Gr. = 4·1...4·3.

Octahedral Corundum. J. 3.
Automalite. J. 2.
Automolith. W.
Spinelle zincifère. H.

3. † RHOMBOHEDRAL.

Rhombohedral. R = 86° 6′. Cleavage, R − ∞. More distinct R. H. = 9·0. Sp. Gr. = 3·8...4·3.

Rhomboidal Corundum. J. 3.
Sapphire. Emery. Corundum. J. 2.
Saphyr. Schmirgel. Korund. Demantspath. W.
Corindon. H.

4. † PRISMATIC.

Prismatic. P = 139° 53′; 86° 16′; 107° 29′. P + ∞ = 128° 35′. Cleavage, $\breve{P}r$ + ∞. H. = 8·5. Sp. Gr. = 3·7...3·8.

Prismatic Corundum or Chrysoberyl. J. 3.
Crysoberyl. J. 2.
Krisoberil. W.
Cymophane. H.

III. DIAMOND.

Tessular. H. = 10·0. Sp. Gr. = 3·4...3·6.

1. OCTAHEDRAL.

Tessular. Cleavage, octahedron.

Octahedral Diamond. J. 3.
Diamond. J. 2.
Demant. W.
Diamant. H.

IV. TOPAZ.

Prismatic. Cleavage, axotomous. H. = 8·0. Sp. Gr. = 3·4...3.6.

1. † PRISMATIC.

Prismatic. P = 141° 7′; 101° 52′; 90° 55′. P + ∞ = 124° 19′. Cleavage, P — ∞.

Prismatic Topaz. J. 3.
Topaz. Schorlite. Pyrophysalite. J. 2.
Topas. Phisalit. Piknit. W.
Silice fluatée alumineuse. H.

V. EMERALD.

Rhombohedral, prismatic. Cleavage, prismato-rhombohedral, or prismatoidal; the first more distinct perpendicular to the axis. H. = 7·5...8·0. Sp. Gr. = 2·6...3·2.

1. PRISMATIC.

Hemiprismatic. P unknown. $\frac{\bar{P}}{2}$. P + ∞ = 133° 26′. Cleavage, $\breve{P}r$ + ∞, perfect. H. = 7·5. Sp. Gr. = 2·9...3·2.

Prismatic Emerald or Euclase. J. 3.
Euclase. J. 2.
Euklas. W.
Euclase. H.

2. RHOMBOHEDRAL.

Dirhombohedral. 2 R = 138° 35′; 90°. Cleavage, R — ∞. Less perfect P + ∞. H. = 7·5...8·0. Sp. Gr. = 2·6...2·8.

Rhombohedral Emerald. J. 3.
Emerald. J. 2.
Schmaragd. Beril. W.
Emeraude. H.

VI. QUARZ.

Rhombohedral. Cleavage, not perpendicular to the axis. H. = 5·5...7·5. Sp. Gr. = 1·9...2·7.

1. PRISMATO-RHOMBOHEDRAL.

Dirhombohedral. R unknown. Cleavage, R + ∞. P + ∞. H. = 7·0...7·5. Sp. Gr. = 2·5...2·6.

Prismato-rhomboidal Iolite. J. 3.
Iolite. J. 2.
Iolith. Peliom. W.
Iolithe. H.

2. † RHOMBOHEDRAL.

Rhombohedral. R = 75° 47′. Cleavage, P = 133° 38′; 103° 53′. P + ∞. H. = 7·0. Sp. Gr. = 2·5...2·7.

Rhomboidal Quartz. J. 3.
Quartz. Iron-flint. Hornstone. Flinty-Slate. Flint. Calcedony. Heliotrope. Jasper. Floatstone. J. 2.
Quarz. Eisenkiesel. Hornstein. Kieselschiefer. Feuerstein. Kalzedon. Jaspis. Heliotrop. Krisopras. Plasma. Kazzenauge. Faserkiesel. Schwimstein. W.
Quarz. H.

3. UNCLEAVABLE.

Uncleavable. H. = 5·5...6·5. Sp. Gr. = 1·9...2·2.

Indivisible Quartz. J. 3.
Opal. Hyalite. Menilite. J. 2.
Opal. Hialith. Menilit. W.
Quarz résinite. H.

4. EMPYRODOX*.

Uncleavable. H. = 6·0...7·0. Sp. Gr. = 2·2...2·4.

Indivisible Quartz. J. 3.
Obsidian. Pitchstone. Pearlstone. Pumice-stone. J. 2.
Obsidian. Pechstein. Perlstein. Bimstein. W.
Lave vitreuse. Petrosilex résiniforme. H.

VII. AXINITE.

Prismatic. Lustre pure vitreous. H. = 6·5...7·0. Sp. Gr. = 3·0....3·3.

1. PRISMATIC.

Tetartoprismatic. P unknown. Cleavage, two faces, the one more distinct than the other. Incidence = 101° 30′.

Prismatic Axinite. J. 3.
Axinite or Thumerstone. J. 2.
Axinit. W.
Axinite. H.

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* From ἔμπυρος, belonging to fire, and δόξα, the opinion, because the varieties of this species are supposed by many to be formed by fire.

VIII. CHRYSOLITE.

Prismatic. Lustre pure vitreous. H. = 6·5...7·0. Sp. Gr. = 3·3...3·5.

1. † PRISMATIC.

Prismatic. $P = 107° 46'; 101° 31'; 119° 41'$. $P + \infty = 94° 3'$. Cleavage, $\breve{Pr} + \infty$. Less distinct $\bar{Pr} + \infty$.

Prismatic Chrysolite. J. 3.
Chrysolite. Olivine. J. 2.
Krisolith. Olivin. W.
Péridot. H.

IX. BORACITE.

Tessular. H. = 7·0. Sp. Gr. = 2·8...3·0.

1. OCTAHEDRAL.

Tessular. Cleavage, octahedron, imperfect.

Hexahedral Boracite. J. 3.
Boracite. J. 2.
Borazit. W.
Magnésie boratée. H.

X. TOURMALINE.

Rhombohedral. H. = 7·0...7·5. Sp. Gr. = 3·0...3·2.

1. RHOMBOHEDRAL.

Rhombohedral. $R = 133° 26'$. Cleavage, R. $P + \infty$.

Rhomboidal Tourmaline. J. 3.
Tourmaline. Schorl. J. 2.
Turmalin. Schörl. W.
Tourmaline. H.

XI. GARNET.

Tessular, pyramidal, prismatic. If colour red: Sp. Gr. = 3·7 and more. If black: Sp. Gr. = 3·9 and less. Lustre not pure vitreous. H. = 6·0...7.5. If = 7·5: colour red or brown. Sp. Gr. = 3·1...4·3.

1. † PYRAMIDAL.

Pyramidal. P = 129° 29′; 74° 14′. Cleavage, P − ∞. P + ∞. [P + ∞]. H. = 6·5. Sp. Gr. = 3·3...3·4.

Pyramidal Garnet. J. 3.
Vesuvian. J. 2.
Vesuvian. Egeran. W.
Idocrase. H.

2. TETRAHEDRAL.

Tessular. Cleavage, octahedron, indistinct. H. = 6·0...6·5. Sp. Gr. = 3·1...3·3.

Helvine. J. 3.
Helvin. W.

3. DODECAHEDRAL.

Tessular. Cleavage, dodecahedron. H. = 6·5...7·5. Sp. Gr. = 3·5...4·3.

Dodecahedral Garnet. J. 3.
Grossular. Melanite. Allochroite. Garnet. Pyrope. J. 2.
Grossular. Pirenäit. Melanit. Allochroit. Kolophonit. Granat. Pirop. W.
Grenat. H.

4. PRISMATIC.

Prismatic. P unknown. Cleavage, $P + \infty = 102° 40'$, indistinct. H. = 7·0...7·5. Sp. Gr. = 3·5...3·7.

Cinnamon Stone. J. 3.
Cinnamon Stone. J. 2.
Kaneelstein. W.
Essonite. H.

5. PRISMATOIDAL.

Prismatic. $P = 131° 54'$; $80° 43'$; $124° 48'$. $P + \infty = 129° 30'$. Cleavage, $\breve{P}r + \infty$, perfect. H. = 7·0...7·5. Sp. Gr. = 3·3...3·9.

Prismatic Garnet, or Grenatite. J. 3.
Grenatite. J. 2.
Staurolith. W.
Staurotide. H.

XII. ZIRCON.

Pyramidal. H. = 7·5. Sp. Gr. = 4·5...4·7.

1. † PYRAMIDAL.

Pyramidal. $P = 123° 19'$; $84° 20'$. Cleavage, P. $P + \infty$.

Pyramidal Zircon. J. 3.
Zircon. J. 2.
Zirkon. Hiazinth. W.
Zircon. H.

XIII. GADOLINITE.

Prismatic. Black. H. = 6·5...7·0. Sp. Gr. = 4·0... 4·3.

1. PRISMATIC.

Hemiprismatic. P unknown. $P + \infty = 110°$ (nearly).

Prismatic Gadolinite. J. 3.
Gadolinite. J. 2.
Gadolinit. W.
Gadolinite. H.

VIII. ORDER—ORE.

I. TITANIUM-ORE.

Pyramidal, prismatic. H. = 5·0...6·5. Sp. Gr. = 3·4 ...4·4. If under 4·2: Streak uncoloured.

1. PRISMATIC.

Hemiprismatic. P = 111° 12′; 88° 47′; 131° 16′. $\frac{P}{2}$ = 111° 12′. P + ∞ = 103° 20′. $\bar{P}r$ = 60°. $(\bar{P}r + \infty)^3$ = 136° 50′. Cleavage, $\frac{\bar{P}}{2}$. Streak uncoloured. H. = 5·0...5·5. Sp. Gr. = 3·4 ...3·6.

Prismatic Titanium-Ore or Sphene. J. 3.
Sphene. J. 2.
Gelb-Mänakerz. Braun-Mänakerz. W.
Titane siliceo-calcaire. H.

2. PRISMATO-PYRAMIDAL.

Pyramidal. P = 117° 2′; 95° 13′. Cleavage, P + ∞. [P + ∞]. Streak brown. H. = 6·0...6·5. Sp. Gr. = 4·2...4·4.

Prismato-pyramidal Titanium-Ore. J. 3.
Nigrine. Rutile. J. 2.
Rutil. Nigrin. W.
Titane oxydé. H.

3. PYRAMIDAL.

Pyramidal. P = 97° 38′; 137° 10′. Cleavage, P − ∞. P. Streak uncoloured. H. = 5·5...6·0. Sp. Gr. = 3·8...3·9.

Pyramidal Titanium-Ore or Octahedrite. J. 3.
Octahedrite. J. 2.
Oktaedrit. W.
Titane Anatase. H.

II. ZINC-ORE.

Prismatic. H. = 4·0...4·5. Sp. Gr. = 6·2...6·3.

1. PRISMATIC.

Prismatic. P unknown. Cleavage, P + ∞ = 125° (nearly). Traces of $P\breve{r}$ + ∞. Streak orange-yellow.

Red Zinc or Red Oxide of Zinc. J. 3.
Red Zinc-Ore or Red Oxide of Zinc. J. 2.

III. COPPER-ORE.

Tessular. H. = 3·5...4·0. Sp. Gr. = 5·6...6·0.

1. OCTAHEDRAL.

Tessular. Cleavage, octahedron. Streak red.

Octahedral Red Copper-Ore. J. 3.
Red Copper-Ore. Tile-Ore. J. 2.
Roth-Kupfererz. Ziegelerz. W.
Cuivre oxydulé. H.

IV. TIN-ORE.

Pyramidal. Streak not black. H. = 6·0...7·0. Sp. Gr. = 6·3...7·0.

1. PYRAMIDAL.

Pyramidal. P = 133° 36′; 67° 42′. Cleavage, P + ∞. [P + ∞]. Streak uncoloured...brown.

Pyramidal Tin-Ore. J. 3.
Tinstone. *Wood-Tin or Cornish Tin-Ore.* J. 2.
Zinstein. *Kornisch Zinerz.* W.
Etain oxydé. H.

V. SCHEELIUM-ORE.

Prismatic. H. = 5·0...5·5. Sp. Gr. = 7·1...7·4.

1. PRISMATIC.

Hemiprismatic. P = 115° 23′; 98° 12′; 115° 23. $\frac{P}{2}$ = 115° 23′. P + ∞ = 98° 12′. Cleavage, $\breve{P}r$ + ∞ perfect. Streak reddish-brown, dark.

Prismatic Wolfram. J. 3.
Wolfram. J. 2.
Wolfram. W.
Schéelin ferruginé. H.

VI. TANTALUM-ORE.

Prismatic. Streak brownish-black. H. = 6·0. Sp. Gr. = 6·0...6·3.

1. PRISMATIC.

Prismatic. P unknown.

Prismatic Tantalum-Ore. J. 3.
Tantalite. J. 2.

VII. URANIUM-ORE.

Form unknown. Streak black. H. = 5·5. Sp. Gr. = 6·4...6·6.

1. UNCLEAVABLE.

Uncleavable. Reniform, massive.

Indivisible Uranium-Ore. J. 3.
Pitch-Ore. J. 2.
Pecherz. W.
Urane oxydulé. H.

VIII. CERIUM-ORE.

Form unknown. Streak uncoloured. H. = 5·5. Sp. Gr. = 4·6...5·0.

1. UNCLEAVABLE.

Uncleavable. Massive.

Indivisible Cerium-Ore. J. 3.
Cerite. J. 2.
Cerinstein. W.
Cérium oxydé silicifère. H.

IX. CHROME-ORE.

Prismatic. Streak brown. H. = 5·5. Sp. Gr. = 4·4 ...4·5.

1. PRISMATIC.

Prismatic. P unknown. Cleavage prismatoidal.

Prismatic Chrome-Ore. J. 3.
Chromate of Iron. J. 2.
Chrom-Eisenstein. W.
Fer chromaté. H.

X. IRON-ORE.

Tessular, rhombohedral, prismatic. H. = 5·0...6·5. Sp. Gr. = 3·8...5·2. If streak brown: Sp. Gr. under 4·2 or above 4·8. If streak black: Sp. Gr. above 4·8.

1. OCTAHEDRAL.

Tessular. Cleavage, octahedron. Streak black. H. = 5·5...6·5. Sp. Gr. = 4·8...5·2.

Octahedral Iron-Ore. J. 3.
Magnetic Ironstone. J. 2.
Magnet-Eisenstein. W.
Fer oxydulé. H.

2. † RHOMBOHEDRAL.

Rhombohedral. R = 85° 58′. Cleavage, R. Sometimes R − ∞. Streak red...reddish-brown. H. = 5·5...6·5. Sp. Gr. = 4·8...5·2.

Rhomboidal Iron-Ore. J. 3.
Specular Iron-Ore or Iron-Glance. *Red Ironstone.* J. 2.
Eisenglanz. *Rotheisenstein.* W.
Fer oligiste. H.

3. PRISMATIC.

Prismatic. P unknown. Cleavage, a prism. Streak yellowish-brown. H. = 5·5. Sp. Gr. = 3·8...4·2.

Prismatic Iron-Ore. J. 3.
Brown Ironstone. J. 2.
Brauneisenstein. W.
Fer oxydé. H.

XI. MANGANESE-ORE.

Prismatic. H. = 2·5...6·0. Sp. Gr. = 4·3...4·8.

1. PRISMATIC.

Prismatic. P unknown. Cleavage, unknown, imperfect. Streak black, inclining to brown. H. = 5·0...6·0.

Prismatic Manganese-Ore. J. 3.
Black Manganese-Ore. Black Ironstone. J. 2.
Schwarzer Braunstein. Schwarz-Eisenstein. W.
Manganèse oxydé. H.

2. PRISMATOIDAL.

Prismatic. P unknown. Cleavage, $P + \infty = 100°$ (nearly). More distinct $\breve{Pr} + \infty$. Streak black. H. = 2·5...3·0.

Prismatic Manganese-Ore. J. 3.
Grey Manganese-Ore. J. 2.
Grauer Braunstein. W.
Manganèse oxydé. H.

IX. ORDER—METAL.

I. ARSENIC.

Form unknown. Tin-white. H. = 3·5. Sp. Gr. = 5·7...5·8.

1. NATIVE. *

Reniform, massive.

Native Arsenic. J. 3.
Native Arsenic. J. 2.
Gediegen Arsenik. W.
Arsenic natif. H.

II. TELLURIUM.

Form unknown. Tin-white. H. = 2·0...2·5. Sp. Gr. = 6·1...6·2.

1. NATIVE.

Massive.

Hexahedral Tellurium. J. 3.
Native Tellurium. J. 2.
Gediegen Silvan. W.
Tellure natif. H.

III. ANTIMONY.

Tessular, prismatic. Not ductile. White. H. = 3·0...3·5. Sp. Gr. = 6·5...10·0.

* Till the form is known.

1. DODECAHEDRAL.

Tessular. Cleavage, octahedron, dodecahedron. H. = 3·0...3·5. Sp. Gr. = 6·5...6·8.

Dodecahedral Antimony or Native Antimony. J. 3.
Native Antimony. J. 2.
Gediegen Spiesglas. W.
Antimoine natif. H.

2 PRISMATIC.

Prismatic. P unknown. Cleavage, P — ∞. P̆r. Less distinct P + ∞. H. = 3·5. Sp. Gr. = 8·9...10·0.

Octahedral Antimony. J. 3.
Native Antimony. J. 2.
Spiesglas-Silber. W.
Argent antimonial. H.

IV. BISMUTH.

Tessular. Silver-white, inclining to red. H. = 2·0...2·5. Sp. Gr. = 8·5...9·0.

1. OCTAHEDRAL.

Tessular. Cleavage, octahedron.

Octahedral Bismuth. J. 3.
Native Bismuth. J. 2.
Gediegen Wismuth. W.
Bismuth natif. H.

V. MERCURY.

Tessular, fluid. Not malleable. White. H. = 0·0...3·0. Sp. Gr. = 10·5...15·0.

1. DODECAHEDRAL.

Tessular. Cleavage, none. Silver-white. H. = 1·0...3·0. Sp. Gr. = 10·5...12·5.

Dodecahedral Mercury or Native Amalgam. J. 3.
Native Amalgam. J. 2.
Natürlich Amalgam. W.
Mercure argental. H.

2. FLUID.

Fluid. Tin-white. H. = 0·0. Sp. Gr. = 12·0 ..15·0.

Fluid Native Mercury. J. 3.
Native Mercury. J. 2.
Gediegen Quecksilber. W.
Mercure natif. H.

VI. SILVER.

Tessular. Ductile. Silver-white. Sp. Gr. = 10·0... 10·5.

1. HEXAHEDRAL.

Tessular. Cleavage, none.

Hexahedral Silver. J. 3.
Native Silver. J. 2.
Gediegen Silber. W.
Argent natif. H.

VII. GOLD.

Tessular. Gold-yellow. Sp. Gr. = 12·0...20·0.

1. HEXAHEDRAL.

Tessular. Cleavage, none.

Hexahedral Gold. J. 3.
Native Gold. J. 2.
Gediegen Gold. W.
Or natif. H.

VIII. PLATINA.

Form unknown. Steel-grey. Sp. Gr. = 16·0...20·0.

1. NATIVE.

Grains, rolled pieces.

Native Platina. J. 3.
Native Platina. J. 2.
Gediegen Platin. W.
Platine natif. H.

IX. IRON.

Tessular. Pale steel-grey. Sp. Gr. = 7·4...7·8.

1. OCTAHEDRAL.

Tessular. Cleavage, none.

Octahedral Iron. J. 3.
Native Iron. J. 2.
Gediegen Eisen. W.
Fer natif. H.

X. COPPER.

Tessular. Copper-red. Sp. Gr. = 8·4...8·9.

1. OCTAHEDRAL.

Tessular. Cleavage, none.

Octahedral Copper. J. 3.
Native Copper. J. 2.
Gediegen Kupfer. W.
Cuivre natif. H.

X. ORDER—PYRITES.

I. NICKEL-PYRITES.

Prismatic. H. = 5·0...5·5. Sp. Gr. = 7·5...7·7.

1. PRISMATIC.

Prismatic. P unknown. Copper-red.

Prismatic Nickel-Pyrites. J. 3.
Copper-Nickel. J. 2.
Kupfernickel. W.
Nickel arsenical. H.

II. ARSENIC-PYRITES.

Prismatic. If white: Sp. Gr. = 6·2 and less. If grey: Sp. Gr. above 6·8. H. = 5·0...6·0. Sp. Gr. = 5·7 ...7·4.

1. AXOTOMOUS.

Prismatic. P unknown. Cleavage, $P - \infty$. Less distinct $P + \infty$. Pale steel-grey. H. = 5·0...5·5. Sp. Gr. = 6·9...7·4.

Prismatic Arsenical Pyrites. J. 3.

2. PRISMATIC.

Prismatic. P = 154° 48′; 100° 34′; 84° 56′. $P + \infty$ = 147° 3′. Cleavage, $P - \infty$. $(\check{P}r + \infty)^3$ = 111° 19′. White. H. = 5·5...6·0. Sp. Gr. = 5·7...6·2.

Diprismatic Arsenical Pyrites. J. 3.
Arsenical Pyrites. J. 2.
Arsenikkies. W.
Fer arsenical. H.

III. COBALT-PYRITES.

Tessular. H. = 5·5. Sp. Gr. = 6·0...6·6.

1. OCTAHEDRAL.

Tessular. Cleavage, hexahedron, octahedron, dodecahedron, almost none; sometimes the hexahedron more discernible. White inclining to steel grey. H. = 5·5. Sp. Gr. = 6·0...6·6.

Octahedral Cobalt-Pyrites *. J. 3.
Tin-White Cobalt-Ore. J. 2.
Weisser Speiskobold. W.
Cobalt arsenical. H.

2. HEXAHEDRAL.

Tessular. Cleavage, hexahedron, perfect. White, inclining to red. H. = 5·5. Sp. Gr. = 6·1...6·3.

Hexahedral Cobalt Pyrites or Silver-White Cobalt. J. 3.
Silver-White Cobalt-Ore or Cobalt-Glance. J. 2.
Glanzkobold. W.
Cobalt gris. H.

IV. IRON-PYRITES.

Tessular, rhombohedral, prismatic. Yellow. H. = 3·5 ...6·5. Sp. Gr. = 4·4...5·0.

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* Grey Cobalt-Ore and the fibrous White Cobalt-Ore, are commonly adjoined to Octahedral Cobalt Pyrites; they differ however from it, by a specific gravity = 7·0...7·3, and several other characters.

1. HEXAHEDRAL.

Tessular. Cleavage, hexahedron. Bronze-yellow. H. = 6·0...6·5. Sp. Gr. = 4·7...5·0.

Hexahedral Iron-Pyrites. J. 3.
Common Iron-Pyrites. Cellular Pyrites. J. 2.
Gemeiner Schwefelkies. Zellkies. W.
Fer sulfuré. H.

2. PRISMATIC.

Prismatic. P = 115° 53′; 89° 11′; 125° 16′. Cleavage, P + ∞ = 106° 36′. Bronze-yellow. H. = 6.0...6·5. Sp. Gr. = 4·7...5·0.

Prismatic Iron-Pyrites. J. 3.
Radiated-Pyrites. Hepatic or Liver-Pyrites. J. 2.
Strahlkies. Kamkies. Leberkies. Spärkies. W.
Fer sulfuré blanc. H.

3. RHOMBOHEDRAL.

Dirhombohedral. R unknown. Cleavage, R − ∞. Less distinct P + ∞. H. = 3·5...4·5. Sp. Gr. = 4·4...4·7.

Rhomboidal Iron-Pyrites. J. 3.
Magnetic Pyrites. J. 2.
Magnetkies. W.
Fer sulfuré ferrifère. H.

V. COPPER-PYRITES.

Pyramidal. H. = 3·0...4·0. Sp. Gr. = 4·1...4·3.

1. † PYRAMIDAL.

Pyramidal. P = 109° 53′; 108° 40′. Cleavage, P + 1 = 101° 49′; 126° 11′. Brass-yellow.

Octahedral Copper-Pyrites or Yellow Copper-Pyrites. J. 3.
Copper-Pyrites or Yellow Copper-Ore. J. 2.
Kupferkies. W.
Cuivre pyriteux. H.

XI. ORDER—GLANCE.

I. COPPER-GLANCE.

Tessular, prismatic. H = 2·5...4·0. Sp. Gr. = 4·4... 5·8. If above 5: colour blackish lead-grey. If under 5: steel-grey or black.

1. TETRAHEDRAL.

Tessular. Cleavage, octahedron. Steel-grey...iron-black. H = 3·0...4·0. Sp. Gr. = 4·4...4·9.

Tetrahedral Copper-Pyrites. J. 3.
Grey Copper-Ore. Black Copper-Ore. J. 2.
Fahlerz. Schwarzerz. W.
Cuivre gris. H.

2. PRISMATOIDAL.

Prismatic. P unknown. Cleavage, $\breve{Pr} + \infty$. Blackish lead-grey. Brittle. H. = 3·0. Sp. Gr. = 5·7...5·8.

Prismatic Antimony Glance. J. 3.

3. PRISMATIC.

Prismatic. P unknown. Cleavage, $P + \infty = 120°$ (nearly). $\breve{Pr} + \infty$. Sectile in a high degree. Blackish lead-grey. H. = 2·5...3·0. Sp. Gr. = 5·5...5·8.

Rhomboidal Copper-Glance. J. 3.
Copper-Glance or Vitreous Copper-Ore. J. 2.
Kupferglas. W.
Cuivre sulfuré. H.

II. SILVER-GLANCE.

Tessular. Blackish lead-grey. H. = 2·0...2·5. Sp. Gr. = 6·9...7·2.

1. HEXAHEDRAL.

Tessular. Cleavage, none. Malleable.

Hexahedral Silver-Glance. J. 3.
Silver-Glance or Sulphuretted Silver-Ore. J. 2.
Glaserz. W.
Argent sulfuré. H.

III. LEAD-GLANCE.

Tessular. Pure lead-grey. H. = 2·5. Sp. Gr. = 7·4 ...7.6.

1. HEXAHEDRAL.

Tessular. Cleavage, hexahedron.
Hexahedral Galena or Lead-Glance. J. 3.
Galena or Lead-Glance. Blue Lead-Ore. J. 2.
Bleiglanz. Blau-Bleierz. W.
Plomb sulfuré. H.

IV. TELLURIUM-GLANCE.

Prismatic. Single perfect cleavage. H. = 1·0...1·5. Sp. Gr. = 7·0...7·2.

1. PRISMATIC.

Prismatic. P unknown. Cleavage, perfect in one direction. Blackish lead-grey.

Prismatic Black Tellurium. J. 3.
Black Tellurium-Ore. J. 2.
Nagyagererz. W.
Tellure natif auro-plombifère. H.

V. MOLYBDENA-GLANCE.

Rhombohedral. Easily flexible. H = 1·0...1.5. Sp. Gr. = 4·4...4·6.

1. RHOMBOHEDRAL.

Dirhombohedral. R unknown. Cleavage, R — ∞, perfect. Pure lead-grey.

Rhomboidal Molybdena. J. 3.
Molybdena. J. 2.
Wasserblei. W.
Molybdène sulfuré. H.

VI. BISMUTH-GLANCE.

Prismatic. Pure lead-grey. H. = 2·0...2·5. Sp. Gr. = 6·1...6·4.

1. PRISMATIC.

Prismatic. P unknown. Cleavage, P + ∞. $\breve{Pr}$ + ∞. $\bar{Pr}$ + ∞.

Prismatic Bismuth-Glance. J. 3.
Bismuth-Glance or Sulphuretted Bismuth. J. 2.
Wismuthglanz. W.
Bismuth sulfuré. H.

VII. ANTIMONY-GLANCE.

Prismatic. H. = 1·5...2·5. Sp. Gr. = 4·0...5·8. If under 5·0: H. = 2·0, and sometimes a little flexible. If above 5·0: colour steel-grey.

1. PRISMATIC.

Prismatic. P unknown. Cleavage $\breve{Pr}$ + ∞, perfect. Less distinct $\bar{Pr}$ + ∞. Pure steel-grey. H. = 1·5...2·0. Sp. Gr. = 5·7...5·8.

Prismatic Gold-Glance. J. 3.
Graphic Tellurium or Graphic-Ore. J. 2.
Schrifterz. W.
Tellure natif auro-argentifère. H.

2. PRISMATOIDAL.

Prismatic. P unknown. Cleavage, $\breve{P}r + \infty$, perfect. Less distinct $P - \infty$. $P + \infty$. $\bar{P}r + \infty$. Lead-grey. H. = 2·0. Sp. Gr. = 4·0...4·6.

Prismatoidal Antimony-Glance or Grey Antimony. J. 3.
Grey Antimony-Ore. J. 2.
Grauspiesglaserz. W.
Antimoine sulfuré. H.

3. AXOTOMOUS.

Prismatic. P unknown. Cleavage, $P - \infty$, perfect. Steel-grey. H. = 2·0...2·5. Sp. Gr. = 5·5...5·8.

Axifrangible Antimony-Glance or Bournonite. J. 3.

VIII. MELANE*-GLANCE.

Prismatic. Black, partly inclining to lead-grey. H. = 2·0...3·0. Sp. Gr. = 5·9...6·6.

1. DIPRISMATIC.

Prismatic. P unknown. Cleavage, $\bar{P}r + \infty$. $\breve{P}r + \infty$, the latter somewhat more discernible, both imperfect. Iron-black, inclining to lead-grey. H. = 2·5...3·0. Sp. Gr. = 6·4...6·6.

Axifrangible Antimony-Glance or Bournonite. J. 3.
Bournonite or Antimonial Lead-Ore. J. 2.
Schwarzspiesglaserz. W.
Plomb sulfuré antimonifère. H.

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* From μέλας, black.

2. PRISMATIC.

Prismatic. P unknown. Cleavage, $P+\infty = 124°$ (nearly). $\breve{P}r+\infty$, imperfect. Iron-black. H. = 2·0...2·5. Sp. Gr. = 5·9...6·4.

Rhomboidal Silver-Glance or Brittle Silver-Glance. J. 3.
Brittle Silver-Glance. J. 2.
Sprödglaserz. W.
Argent antimonié sulfuré noir. H.

XII. ORDER—BLENDE.

I. GLANCE-BLENDE.

Prismatic. Streak green. H. = 3·5...4·0. Sp. Gr. = 3·9...4·0.

1. PRISMATIC.

Prismatic. P unknown. Cleavage, a prism. Metallic.

Prismatic Manganese-Blende. J. 3.
Sulphuret of Manganese. J. 2.
Braunsteinblende. Blumenbach.
Manganèse sulfuré. H.

II. GARNET-BLENDE.

Tessular. Streak not green. H. = 3·5...4·0. Sp. Gr. = 4·0...4·2.

1. DODECAHEDRAL.

Tessular. Cleavage, dodecahedron. Streak uncoloured...reddish-brown.

Dodecahedral Zinc-Blende. J. 3.
Blende. J. 2.
Blende. W.
Zinc sulfuré. H.

III. PURPLE-BLENDE.

Prismatic. H. = 1·0...1·5. Sp. Gr. = 4·5...4·6.

1. PRISMATIC.

Prismatic. P unknown. Cleavage, prismatoidal. Streak red.

Prismatic Antimony-Blende or Red Antimony. J. 3.
Red Antimony-Ore. J. 2.
Rothspiesglaserz. W.
Antimoine oxydé sulfuré. H.

IV. RUBY-BLENDE.

Rhombohedral. H. = 2·0...2·5. Sp. Gr. = 5·2...8·2.

1. RHOMBOHEDRAL.

Rhombohedral. R = 109° 28′. Cleavage, R. Streak red. H. = 2·5. Sp. Gr. = 5·2...5·8.

Rhomboidal Ruby-Blende or Red Silver. J. 3.
Red Silver-Ore. J. 2.
Rothgiltigerz. W.
Argent antimonié sulfuré. H.

2. PRISMATO-RHOMBOHEDRAL.

Rhombohedral. R = 85° (nearly). Cleavage, R + ∞, perfect. Streak red. H. = 2·0...2·5. Sp. Gr. = 6·7...8·2.

Prismato-rhomboidal Ruby-Blende or Cinnabar. J. 3.
Cinnabar. Hepatic-Mercurial-Ore or Mercurial-Liver-Ore. J. 2.
Zinnober. Quecksilber-Lebererz. W.
Mercure sulfuré. H.

XIII. ORDER—SULPHUR.

I. SULPHUR.

Prismatic. H. = 1·5...2·5. Sp. Gr. = 1·9...3·6.

1. PRISMATOIDAL.

Prismatic. P unknown. Cleavage, prismatoidal eminent. Streak lemon-yellow. H. = 1·5...2·0. Sp. Gr. = 3·4...3·6.

Yellow Orpiment or Prismatoidal Sulphur. J. 3.
Yellow Orpiment. J. 2.
Gelb-Rauschgelb. W.
Arsénic sulfuré jaune. H.

2. HEMIPRISMATIC.

Hemiprismatic. P unknown. Cleavage, $P + \infty = 107° 42'$. $\breve{P}r + \infty$. $\bar{P}r + \infty$. None distinct. Streak orange-yellow...aurora-red. H. = 1·5...2·0. Sp. Gr. = 3·3...3·4.

Red Orpiment or Ruby-Sulphur or Hemi-Prismatic Sulphur. J. 3.
Red Orpiment or Realgar. J. 2.
Roth-Rauschgelb. W.
Arsénic sulfuré rouge. H.

3. PRISMATIC.

Prismatic. $P = 107° 19'; 84° 24'; 143° 8'$. Cleavage, P. $P + \infty = 102° 41'$. Streak uncoloured...sulphur-yellow. H. = 1·5...2·5. Sp. Gr. = 1·9...2·1.

Prismatic Sulphur. J. 3.
Sulphur. J. 2.
Natürlicher Schwefel. W.
Soufre. H.

CHARACTERS

OF THE

GENERA AND SPECIES

OF THE

ORDERS OF CLASS III.

I. ORDER—RESIN.

I. MELICHRONE*-RESIN.

Pyramidal. H. = 2·0...2·5. Sp. Gr. = 1·4...1·6.

1. PYRAMIDAL.

Pyramidal. P = 118° 4′; 93° 22′. Cleavage, P, imperfect.

Pyramidal Honeystone. J. 3.
Honeystone. J. 2.
Hönigstein. W.
Mellite. H.

II. MINERAL-RESIN.

Amorphous. H. = 0·0...2·5. Sp. Gr. = 0·8...1·2.

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* From μελίχροος, honey-coloured.

1. YELLOW.

Solid. Yellow...white. Streak uncoloured. H. = 2·0...2·5. Sp. Gr. = 1·0...1·1.

Yellow Mineral Resin or Amber. J. 3.
Amber. J. 2.
Bernstein. W.
Succin. H.

2. BLACK.

Solid...fluid. Black, brown, red, grey. Streak black, brown, yellow, grey. H. = 0·0...2·0. Sp. Gr. = 0·8...1·2.

Black Mineral-Resin. J. 3.
Fossil oil. Mineral pitch. J. 2.
Erdöl. Erdpech. W.
Bitume. H.

II. ORDER—COAL.

I. MINERAL COAL.

Amorphous. H. = 1·0...2·5. Sp. Gr. = 1·2...1·5.

1. BITUMINOUS.

Black; brown. Lustre resinous. Odour bituminous. H. = 1·0 ...2·5. Sp. Gr. = 1·2...1·5.

Brown Coal. Black Coal. J. 3.
Brown Coal. Black Coal. J. 2.
Braunkohle. Schwarzkohle. W.
Houille. Jayet. H.

2. UNBITUMINOUS.

Black. Partly imperfect metallic lustre. No bituminous smell. H. = 2·0...2·5. Sp. Gr. = 1·3...1·5.

Glance-Coal. J. 3.
Glance-Coal. J. 2.
Schwarzkohle. Glanzkohle. W.
Anthracite. H.

APPENDIX,

CONTAINING

MINERALS,

THE NATURAL HISTORY DETERMINATION OF WHICH HAS NOT BEEN COMPLETED.

ALLANITE. Thomson.

(ORE.)

Prismatic. $P + \infty = 117°$ (nearly). Colour brownish-black. Streak greenish-grey. H. unknown. Sp. Gr. = 3·523...4·001 (Thomson).

Prismatic Cerium-Ore. J.* iii. III. 181.

AMBLYGONITE. Breithaupt.

(SPAR.)

Prismatic. $P + \infty = 106° 10'$. Cleavage, $P + \infty$. Less distinct $\breve{Pr} + \infty$. H. = 6·0 (Breithaupt). Sp. Gr. = 3·00...3·04 (Breithaupt).

Amblygonite. J. iii. III. 532.

Amblygonit. Hoff. ‡

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* A System of Mineralogy, in which minerals are arranged according to the natural-history method, by *R. Jameson.* Third edition.

‡ Handbuch der Mineralogie von *C. A. S. Hoffmann* fortgesetzt von *A. Breithaupt.*

APHRITE. Jameson.

Prismatic. Cleavage, single very eminent. Colour white. H. = 0·5...1·0. Sp. Gr. unknown.

Aphrite. J. iii. II. 543.
Schaumkalk. Hoff.
Chaux carbonatée nacrée. Haüy.*

APLOME. Haüy.

(GEM.)

Tessular. Cleavage, hexahedron, imperfect. H. = 7·0. Sp. Gr. = 3·444 (Haüy).

Aplome. J. iii. III. 533.
Aplome. Haüy.

ARGENTIFEROUS COPPER-GLANCE. Jameson.

(GLANCE.)

Form unknown. Metallic. Blackish lead-grey. H. = 3·0. Sp. Gr. = 6·255 (Stromeyer).

Argentiferous Copper-Glance. J. iii. III. 551.
Silberkupferglanz. Hoff.

ATACAMITE. Jameson.

(MICA.)

Prismatic. Cleavage, prismatoidal, very eminent. Streak leek... grass-green. H. soft (Breithaupt). Sp. Gr. = 4·4?

Atacamite. J. iii. II. 343.
Salzkupfererz. Hoff.
Cuivre muriaté. Haüy.

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* Tableau comparatif des résultats de la cristallographie et de l'analyse chimique par *M. l'Abbé Haüy.*

AZURESTONE. Jameson.

(SPAR.)

Tessular. Form dodecahedron. Cleavage, unknown, imperfect. Azure-blue. H. = 5·5...6·0. Sp. Gr. = 2·767 (Brisson)...2·959 (Karsten).

Azurestone or Lapis lazuli. J. iii. I. 399.
Lasvrstein. Hoff.
Lazulite. Haüy.

BERGMANNITE. Haüy.

(SPAR).

Form unknown. H. soft, inclining to semihard (Breithaupt); scratches glass and even quartz (Haüy.) Sp. Gr. = 2·300 (Schumacher).

Var. of pyramidal Felspar or Scapolite. J. iii. II. 43.
Spreustein. Hoff.
Bergmannite. Haüy.

BLEIFAHLERZ. Hausmann.

(GLANCE.)

Prismatic. Cleavage, $P - \infty$. Less distinct $P + \infty = 95°$ (nearly). $\breve{P}r + \infty$. $\bar{P}r + \infty$. Metallic. Steel-grey inclining to lead-grey. H. = 2·5...3·0. Sp. Gr. = 5·7...5·8.

Bleifahlerz. Hausmann,* I. 170.

CALAITE. Fischer.

(SPAR.)

Form unknown. Massive. Colour blue...green, rather bright. Streak uncoloured. H. = 6·0. Sp. Gr. = 2·830...3·000 (Fischer).

Calaïte or Mineral Turquois. J. iii. I. 403.

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* Handbuch der Mineralogie von *J. F. L. Hausmann.*

CHIASTOLITE. Jameson.

(SPAR.)

Prismatic. $P + \infty = 84° \, 48'$. $\bar{P}r = 120°$ (nearly). Cleavage, $P - \infty$. $\breve{P}r + \infty$. $\bar{P}r + \infty$. None distinct. H. = 5·0...5·5. Sp. Gr. = 2·9...3·0.

Chiastolite. J. iii. II. 49.
Hohlspath. Hoff.
Macle. Haüy.

CERIN. Hisinger.

(ORE.)

Prismatic. Cleavage, prismatoidal. Colour brownish-black. Streak yellowish-grey...brown. H. = 5·5...6·0. Sp. Gr. = 4·1...4·3.

Cerin. Hisinger,* 393.

CRICHTONITE. Jameson.

(ORE.)

Rhombohedral. R = 18° (Plane angle at the apex). Cleavage unknown, imperfect. Colour velvet-black. Lustre imperfect-metallic. H. = 4·5 (Bournon). Sp. Gr. unknown.

Crichtonite. J. iii. III. 557.

DIASPORE. Haüy.

(SPAR.)

Prismatic. Cleavage, $P + \infty = 130°$ (nearly). Perfect and eminent $\breve{P}r + \infty$. H. scratches glass (Haüy). Sp. Gr. = 3·4324. (Haüy).

Diaspor. Hoff.
Diaspore. Haüy, 59.

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* Versuch einer mineralogischen Geographie von Schweden, von W. Hisinger. Uebersetzt und mit Erläuterungen und Zusätzen versehen von *K. A. Blöde*.

ELAOLITE. Jameson.

(SPAR.)

Prismatic. Cleavage, $P-\infty$. $\breve{P}r+\infty$. Less distinct $P+\infty$. H. = 5·5...6·0. Sp. Gr. = 2·546...2·618 (Hoffmann.)

Elaolite. J. iii. II. 41.
Fettstein. Hoff.
Pierre grasse. Haüy.

EUDIALYTE. Stromeyer.

Tessular. Cleavage, octahedron, traces of the dodecahedron. Colour brownish red. H. = 5·0...5·5. Sp. Gr. = 2·8...3·0.

Eudialyt. Stromeyer. G. A.* 1819. 3. 379.

FIBROLITE. Bournon.

Prismatic. $P+\infty = 100°$. Cleavage, imperfect. H. harder than quartz (Bournon). Sp. Gr. = 3·214 (Bournon).

Fibrolite. J. iii. III. 535.
Fibrolite. Haüy.

GEHLENITE. Jameson.

(SPAR.)

Pyramidal or prismatic. Cleavage, unknown, imperfect. H. = 5·5...6·0. Sp. Gr. = 2·9...3·1.

Gehlenite. J. iii. I. 138.
Gehlenit. Hoff.

GIESECKITE. Sowerby.

Rhombohedral. Form, $R-\infty$. $R+\infty$. Cleavage, none. Colour grey...brown. Streak uncoloured. H. = 2·5...3·0. Sp. Gr. = 2·7...2·9.

Gieseckit. Stromeyer. G. A. 1819. 3. 372.

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* Annalen der Physik von *L. W. Gilbert.*

HAUYNE. Neergaard.

(SPAR.)

Prismatic. Cleavage, P. More distinct P — ∞. Colour blue, rather bright. H. scratches glass (Haüy). Sp. Gr. = 2·687 (Gmelin). ...3·333 (Gismondi).

Haüyne. J. iii. I. 394.
Hauyn. Hoff.
Latialite. Haüy.

ISERINE. Jameson.

(ORE.)

Form unknown. Lustre imperfect-metallic. Colour black. Streak black. H. = 5·5. Sp. Gr. = 4·650 (Klaproth).

Iserine. J. iii. III. 133.
Iserin. Hoff.

KARPHOLITH. Werner.

Form unknown. Thin prismatic distinct concretions. Colour yellow. H. unknown. Sp. Gr. = 2·935 (Breithaupt).

Karpholith. Min. Syst.* 43.

LIEVRITE. Jameson.

(ORE.)

Prismatic. P = 139° 37′; 117° 38′; 77° 16′. Cleavage, $\bar{Pr}$ = 113° 2′. P + ∞ = 112° 37′. $\breve{Pr}$ + ∞. None distinct. Colour black. Streak black, inclining sometimes to green or brown. H. = 5·5...6·0. Sp. Gr. = 3·825...4·061 (Lelièvre).

Lievrite. J. iii. III. 539.
Lievrit. Hoff.
Fer siliceo-calcaire. Haüy.

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* A. G. Werners letztes Mineral System.

MANGANESE-SPAR. Jameson.

(BARYTE.)

Form unknown. Colour bright rose-red. H. = 5·0...5·5. Sp. Gr. = 3·5...3·7.

Rhomboidal Red Manganese. J. iii. II. 445.

Manganspath. Hoff.

MELILITE. Haüy.

Prismatic. $P + \infty = 115°$. $\breve{P}r = 70°$ (nearly). Colour yellow. H. strikes fire with steel (Haüy). Sp. Gr. unknown.

Mélilite. H. 64.

MENACHANITE. Jameson.

(ORE.)

Form unknown. Cleavage, imperfect. Lustre imperfect-metallic. Colour black. Streak black. H. = 5·5...6·0. Sp. Gr. = 4·427 (Gregor).

Menachanite. J. iii. III. 135.

Mänakan. Hoff.

Titane oxydé ferrifère. Haüy.

MENAC IRONSTONE. Jameson.

(ORE.)

Form unknown. Cleavage, imperfect. Lustre imperfect-metallic. Colour black. Streak black. H. = 6·0. Sp. Gr. = 4·75 (Breithaupt).

Mänak-Eisenstein. Hoff. IV. 2. 139.

It is probable that Iserine, Menachanite and Menac-Ironstone, together with several similar varieties, from Gastein in Salzbourg, Ohlapian in Transylvania, Klattau in Bohemia, &c. constitute a particular natural-historical species.

MOLYBDENA SILVER. Werner.

Rhombohedral. Cleavage, $R - \infty$, perfect. Metallic. Colour pale steel-grey. Elastic. H. soft (Breithaupt). Sp. Gr. = 8·0 (Breithaupt).

Molibdän-Silber. Min. Syst. 48.

NEEDLE-ORE. Jameson.

(GLANCE.)

Prismatic. Cleavage, unknown, imperfect. Metallic. Colour blackish lead-grey. H. = 2·0...2·5. Sp. Gr. = 6·125 (John).

Acicular Bismuth-Glance. J. iii. III. 381.
Nadelerz. Hoff.
Bismuth sulfuré plumbo-cuprifère. Haüy.

NEPHRITE. Jameson.

Form unknown. Colour green. H. = 7·0. Sp. Gr. = 2·9...3·1.

Nephrite. J. iii. III. 287.
Nephrit. Hoff.
Jade néphrétique. Haüy.

Some of the varieties commonly called Nephrite are likely to belong, as Count de Bournon supposes, to the species Axotomous Triphane-Spar.

NICKELIFEROUS GREY ANTIMONY. Jameson.

(PYRITES.)

Tessular. Cleavage, hexahedron, perfect. Metallic. Colour steel-grey, somewhat inclining to silver-white. H. = 5·0...5·5. Sp. Gr. = 6·4...6·6.

Nickeliferous Grey Antimony. J. iii. III. 403.
Nickelspiessglanzerz. Hausmann.
Antimoine sulfuré nickelifère. Haüy.

PHOSPHATE OF MANGANESE. Jameson.

(ORE.)

Pyramidal or prismatic. Cleavage, three planes perpendicular to each other, one of them less distinct. Colour brown. Streak yellowish-grey...brown. H. = 5·0...5·5. Sp. Gr. = 3·439 (Vauquelin)... 3·775 (Ullmann).

Phosphate of Manganese. J. iii. III. 248.
Pitchy Iron-Ore. Id. Id. 408.
Eisenpecherz. Hoff.
Manganèse phosphaté. Haüy.

PINITE. Jameson.

Rhombohedral. Cleavage, none. Composition, $R-\infty$. H. soft passing into very soft (Breithaupt). Sp. Gr. $=2{\cdot}914$ (Haüy)... 2·980 (Kirwan).

Pinite. J. iii. II. 227.
Pinit. Hoff.
Pinite. Haüy.

PITCHY IRON-ORE, *vide* PHOSPHATE OF MANGANESE.

PYROSMALITE. Hausmann.

Rhombohedral. Cleavage, $R-\infty$, perfect. Less distinct $R+\infty$. Colour liver-brown. Streak brownish-white. H. semihard (Hausmann). Sp. Gr. $=3{\cdot}081$ (Hausmann).

Pyrosmalite. J. iii. III. 561.

RADIATED ACICULAR OLIVENITE. Jameson.

(MICA.)

Prismatic. $P+\infty=105°$ (nearly). Cleavage, $P-\infty$, very eminent. Streak verdigris-green. H. $=2{\cdot}5...3{\cdot}0$. Sp. Gr. $=4{\cdot}1...4{\cdot}3$.

Radiated Acicular Olivenite. J. iii. II. 335.
Strahlerz. Hoff.

SKORODITE. Breithaupt.

Prismatic. Cleavage, $\breve{P}r$, imperfect. Traces of $P+\infty$. Colour green. Streak uncoloured. H. $=3{\cdot}5...4{\cdot}0$. Sp. Gr. $=3{\cdot}1...3{\cdot}3$.

Skorodite. J. iii. III. 547.
Skorodit. Hoff.

SPINELLANE. Haüy.

Rhombohedral. R = 117° 23′. Cleavage, R. P + ∞. H. scratches glass (Haüy). Sp. Gr. unknown.

Spinellane. J. iii. III. 549.
Spinellane. Haüy.

TANTALITE. Eckberg.

(ORE.)

Hemiprismatic. Cleavage, unknown, imperfect. Colour black. Streak brown. H. = 6·5. Sp. Gr. = 7·8...8·0.

Prismatic Tantalum-Ore. J. iii. III. 174.
Tantalit. Hoff.
Tantale oxydé ferro-manganèsifère. Haüy.

TIN-PYRITES. Jameson.

(PYRITES).

Form unknown. Metallic. Colour steel-grey, inclining to yellow. H. = 4·0. Sp. Gr. = 4·350 (Klaproth).

Common Tin-Pyrites. J. iii. III. 325.
Zinnkies. Hoff.
Étain sulfuré. Haüy.

VARIEGATED COPPER. Jameson.

Form unknown. Metallic. Colour copper-red, tarnished. H. = 3·0. Sp. Gr. = 4·9...5·1.

Variegated Copper. J. iii. III. 334.
Bunt-Kupfererz. Hoff.
Cuivre pyriteux hépatique. Haüy.

VELVET-BLUE COPPER. Jameson.

Short capillary crystals. Colour bright blue.

Velvet-Blue Copper. J. iii. II. 320.
Kupfer-Sammterz. Hoff.

WAVELLITE. Jameson.

Prismatic. Cleavage, $P + \infty$. $P\breve{r} + \infty$. Rather distinct. Implanted globular concretions. Streak uncoloured. H. = 3·5...4·0. Sp. Gr. = 2·2...2·4.

Wavellite. J. iii. I. 389.
Wavellit. Hoff.

YELLOW GOLD GLANCE OR YELLOW TELLURIUM. Jameson.

Form unknown. Metallic. Colour silver-white inclining to yellow. H. soft (Breithaupt). Sp. Gr. = 10·678 (Müller von Reichenstein).

Yellow Gold-Glance or *Yellow Tellurium.* J. iii. III. 379.
Weissilvanerz. Hoff.

FINIS.

INDEX.